Voter List Maintenance in Wisconsin:

A Cost-Benefit Analysis

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List of Acronyms

GAB: Government Accountability Board

HAVA: Help America Vote Act of 2002

LAB: Legislative Audit Bureau

NCOA: National Change of Address

NVRA: National Voter Registration Act of 1993

SVRS: Statewide Voter Registration System

USPS: United States Postal Service

VLM: Voter List Maintenance

VRA: Voting Rights Act of 1965

Executive Summary

Pursuant to Wisconsin statute, the state must conduct voter list maintenance (VLM) to identify registered voters who have moved from the addresses on their voter records following each general election. While municipal clerks are officially in charge of performing VLM, the Wisconsin Government Accountability Board (GAB) has been conducting VLM since 2008. Currently, the GAB sends "Notice of Suspension" postcards to all voters who have not voted in the previous four years as a mechanism by which to identify potential movers and inactivate their voter registrations. Under current policy, a voter who is sent a postcard can only remain active if he or she returns a continuation postcard to his or her municipal clerk within 30 days of mailing; otherwise, his or her voter registration is inactivated. The GAB is currently interested in assessing the efficiency of other options; specifically, using either the United States Postal Service's (USPS) National Change of Address (NCOA) database or an NCOA-mass mailing hybrid option to conduct VLM. Based on our analysis, we recommend that the GAB pursue the NCOA-only VLM alternative.

Initially, the GAB sought to assess which of four VLM alternatives was most efficient: current policy, GAB use of the NCOA database, municipal mass mailings, or municipal use of the NCOA database. Under the GAB NCOA option, the GAB would compare its voter registration list against the NCOA database to determine which voters have moved. However, early in our analysis, we ruled out the municipal alternatives as cost-prohibitive, and instead substituted a hybrid alternative that would combine the use of NCOA and mass mailings. That is, the GAB would compare addresses against the NCOA database and send postcards to all voters on the NCOA database as well as to voters who had not voted in the previous four years.

For each alternative, we reviewed a series of crucial costs: the startup costs associated with implementing NCOA, the cost of establishing an NCOA contract, the costs of printing and mailing postcards, and the staff costs associated with processing returned postcards. We also monetized costs of Type I errors, defined as failing to inactivate a voter who has moved, and Type II errors, defined as incorrectly removing a voter who has not moved.

We faced several limitations in conducting our analysis, including, but not limited to, our difficulty in estimating quantities of Type I and Type II errors and monetizing the potential disenfranchisement of eligible voters. Nonetheless, we are confident in our results and recommendation. Our analysis of net costs held when subjected to a Monte Carlo simulation and sensitivity analysis.

Our analysis revealed that the NCOA-only option resulted in significantly lower total costs than the other two alternatives over the next 10 years. While the present value of costs to the GAB under this option are higher than under current policy or the hybrid alternative, those costs would be more than offset by reduced costs to municipalities, voters, and municipal clerks. Therefore, we encourage the GAB to pursue the NCOA-only alternative to minimize the costs of voter list maintenance to the State of Wisconsin and its citizens.

Introduction

At the request of the Wisconsin Government Accountability Board (GAB), we have conducted a cost-benefit analysis of several mechanisms for voter list maintenance (VLM). Each state is responsible for maintaining up-to-date voter lists. According to a 2012 study by the Pew Center on the States, one out of eight voter registrations in the United States is invalid or inaccurate. Furthermore, over 1.8 million deceased people have active registrations and almost 2.8 million people are registered in more than one state (Pew 2012). Without proper maintenance, voter lists contain many ineligible voter registrations, which results in increased costs for election officials and voters. Removing or suspending inactive voters from the rolls is one way to update lists and realize cost savings.

This analysis addresses the extent to which different methods of VLM would reduce costs to the GAB in its administration of Wisconsin's elections. The GAB seeks to maximize cost savings to the state and voters while minimizing inaccuracies on Wisconsin voter rolls.

Overview of VLM[1]

There are major incentives for states to engage in thorough VLM. First, VLM is federally mandated under the National Voter Registration Act of 1993 (NVRA). The NVRA requires states to maintain "accurate and current voter registration rolls" and prohibits states from conducting VLM within 90 days of a federal election (U.S. Election Assistance Commission, 2010). Wisconsin is one of six states not bound by the NVRA because it allows Election Day Registration; however, Wisconsin State Statute requires that VLM be conducted following every general election (Wisconsin Statutes 8.50) (Appendix 2). Second, VLM is done

[1] For a brief overview of the political implications of VLM, see Appendix 1.

to maintain accurate and current voter registrations (GAB, 2013). Accurate VLM could eliminate duplicate registrations as well as remove electors who have moved to a new address, recently passed away, or who do not wish to vote (Perez, 2008). As a result, maintaining accurate voter registrations can increase voter confidence and protect the "integrity of the electoral process" (U.S. Election Assistance Commission, 2010). Finally, VLM may reduce election costs. Elections administration is expensive, with states spending millions of dollars to register voters, print poll books, and verify voter registrations. In a recent case study, the Pew Center on the States (2010) found that the State of Oregon spent more than $8.8 million on voter registration for the 2008 General Election.

VLM practices must be consistent and non-discriminatory, complying with the Voting Rights Act of 1965. Moreover, the Help America Vote Act of 2002 (HAVA) requires that states maintain a "single, uniform, official, centralized, interactive computerized statewide voter registration list" that includes the "name and registration information of every legally registered voter in the State" (USEAC).

Wisconsin Statute 6.50 requires that municipal clerks or a municipal elections board engage in VLM. However, following the findings of a 2007 report from the Legislative Audit Bureau showing that municipal clerks were not reliably maintaining their voter rolls, the GAB assumed responsibility over VLM (Appendix 3.2.2.) The GAB currently maintains voter lists for municipal clerks through the Statewide Voter Registration System (SVRS).

VLM in Practice

In Wisconsin, voter registrations may be inactivated because of changes of address, death, failure to vote, felony conviction, request of voter, mental incapacitation, and other

reasons. Table 1 shows that after the 2012 general election, the GAB marked 580,532 Wisconsin voter registrations (14.6 percent) as ineligible in SVRS. Of these, 45 percent were marked as ineligible due to failure to vote in the past four years, 16.7 percent were marked as ineligible due to death, and 34 percent were marked as ineligible due to other reasons. Similarly, after the 2010 general election, the GAB marked 547,369 (14.8 percent) registrations as ineligible in SVRS. Of these, 54.1 percent were marked as ineligible due to failure to vote in the past four years.

Table 1. Wisconsin Voter List Maintenance Deactivations, 2010 and 2012	2010		2012	
	Frequency	Percent of total	Frequency	Percent of total
Estimated Voting Age Population (VAP)	4,347,494	100	4,408,841	100
Total Registrants	3,709,229	85.3	3,987,248	90.4
Total Deactivations	547,369	14.8	580,532	14.6
Deactivated due to moving from jurisdiction	12,188	2.2	13,952	2.4
Deactivated due to death	124,546	22.8	97,147	16.7
Deactivated due to failure to vote	296,206	54.1	261,368	45.0
Deactivated due to request of voter	970	0.2	1,163	0.2
Deactivated due to felony conviction	8,526	1.6	9,218	1.6
Deactivated due to mental incompetence	483	0.1	99	0.0
Deactivated due to other reasons	104,450	19.1	197,585	34.0

Source: Tables 1a and 4b of *The Impact of the National Voter Registration Act of 1993 on the Administration of Elections for Federal Office 2009-2010* by the U.S. Election Assistance Commission http://www.eac.gov/assets/1/Documents/2010%20NVRA%20FINAL%20REPORT.pdf. Tables 1d and 4b of The Impact of the National Voter Registration Act of 1993 on the Administration of Elections for Federal Office 2011-2012 by the U.S. Election Assistance Commission http://www.eac.gov/assets/1/Documents/EAC_NVRA%20Report_lowres.pdf

Figure 1 (on page 19) is a picture of the postcard entitled "Notice of Suspension of Registration" that is mailed to registered voters in Wisconsin who did not vote in the previous four years. Currently, registrants are asked to return the pre-addressed postcard to their municipal clerk requesting that they remain active in SVRS. Voter registrations of individuals whose

postcards are marked undeliverable or are not returned within thirty days are marked inactive. Table 2 shows that of the 299,748 postcards sent to voter registrants, 35.3 percent were undeliverable and 59.2 percent were not returned. Only 5.6 percent were returned requesting continuation. As a result, over 283,000 individuals were marked as ineligible and must re-register if they desire to vote in the next election. Figure 2 (on page 20) maps the VLM process as it is currently conducted by the GAB.

Table 2. Four-Year Voter Record Maintenance Statistics, 2012	Frequency	Percent of total
Number of Registered Voters in Wisconsin	3,987,248	100
Number of Postcards Sent	299,748	7.5
Postcards Returned Undeliverable	105,667	35.3
Postcards Returned Continuation	16,652	5.6
Postcards Returned Requested Cancellation	7	0.0
Postcards Returned Deceased	278	0.1
Postcards Not Returned	177,420	59.2
Source: Reported by the Wisconsin Government Accountability Board on May 15, 2013.		

Businesses and government entities that spend substantial sums of money on postage and mailing may realize cost savings by reducing the frequency with which they send mail to invalid addresses. One way to identify potentially invalid addresses is through the United States Postal Service's (USPS) National Change of Address database (NCOA). The NCOA database catalogs information on individuals who have moved from their primary residence. The USPS adds names to the NCOA database when movers submit the official change of address form or when postal carriers notify the USPS of an invalid address (See Figure 3 on page 21).

Standing

The first issue to resolve when performing a cost-benefit analysis is which parties have standing: "that is, whose benefits and costs should be included" (Boardman et. al., 2011). In this case, we have determined the state government, municipal clerks, and individual taxpayers and voters in Wisconsin have standing.

Though municipal clerks are required by law to conduct VLM, pursuant to Wisconsin statute the GAB has taken over the process and assumed the personnel, printing, and postage costs of mass mailings. For this reason, the state has standing. Furthermore, the GAB has the responsibility for maintaining voter lists in Wisconsin through SVRS, and any of the alternatives outlined below would require significant state funding. Finally, to ensure election integrity, the state has a democratic imperative to identify ineligible voters still present on the rolls accurately.

Municipal clerks have standing as well because they face benefits and costs under all potential alternatives. We discuss municipal resource and staff costs in greater detail below.

The expenditures and potential savings outlined above, as well as democratic improvements, affect taxpayers and voters in Wisconsin, who therefore also have standing. Both the state and municipal governments require tax revenue to fund VLM. In addition, taxpayers may also benefit from efficiency gains resulting from improved VLM, but potential errors in VLM could disadvantage those erroneously inactivated from the rolls.

Finally, we acknowledge that the standard approach to standing in a cost-benefit analysis is to view it at the national level. To that end, we could presumably estimate a potential benefit of improved VLM extending beyond Wisconsin's borders: namely, an increased ability to inform other states when voters from those states move to Wisconsin. This could make it easier for other states to inactivate such voters from their rolls. However, for the purposes of this

analysis, the GAB is interested in better determining whether voters have moved away from their Wisconsin addresses, not accounting for those who have moved to Wisconsin. None of our alternatives would result in improvements to records of the other states. Therefore, we ignore spillover effects into other states.

Policy Alternatives

Our original task was to perform a cost-benefit analysis of conducting VLM at both the state and municipal level. Our four initial alternatives, as outlined by the GAB, were:

1) GAB mass mailing (current policy)

2) GAB use of the NCOA

3) Municipal mass mailings

4) Municipal use of the NCOA

After analyzing municipal-level data on the number of postcards sent in 2013 and estimating the costs associated with municipal use of NCOA, we determined that both of the alternatives at the municipal level were cost-prohibitive.

For each alternative, the cost of printing and mailing postcards would be significantly higher for municipalities than for the GAB (Appendices 3.3 and 3.4.) In addition, it would be cost-prohibitive for each municipality to contract $NCOA^{Link}$ services (Appendix 3.5.) Further, as noted by the Legislative Audit Bureau's 2007 report, municipal clerks were not properly conducting VLM before the GAB assumed responsibility (Appendix 3.2.2.) After consulting with the GAB, we decided to rule out the municipal alternatives and replace them with a state-level hybrid option that both utilizes the NCOA database and mails notifications to voters who have not voted in the previous four years.

Alternative One: Current Policy–Mass Mailings

The current VLM policy is based on the inactivation of voters who have not voted for two full election cycles, or four years. The process of inactivating voters who have not voted for four years occurs following each November national general election in even years. First, local clerks update voter information in the SVRS in order to identify all voters who have participated in the most recent election. Once a sufficient number of clerks have updated voter information, the GAB compiles a list of all registered voters who have not participated in elections in the previous four years. After the list of inactive voters has been assembled, the GAB bids out a printing contract for postcards that it ultimately mails to these voters.

After the printing contract is finalized, the vendor prints notice of suspension postcards, which the GAB subsequently mails to all inactive voters. By law, the postcards must be sent within 90 days of the general election, but historically this deadline has not been met. After receiving a postcard, recipients have 30 days to return it to their municipal clerk to request continuation of voter registration. If a postcard is not returned within 30 days or if the USPS returns a postcard as undeliverable, then the GAB inactivates the voter record.

Alternative Two: NCOA

The GAB has asked us to explore the possibility of forgoing the current system of VLM in favor of establishing an electronic interface with the USPS' NCOA database to maintain voter records. As discussed previously, the current system seeks to maintain voter rolls by eliminating individuals who have not voted in two consecutive general election cycles.

The NCOA VLM alternative would require the GAB to contract with a private vendor that provides USPS NCOA^{Link} services. NCOA contracts require that its users match their records to the database at least twice per year. Therefore, the GAB would compile the voter registration list into a file, which it would provide to its selected NCOA vendor every six months. The vendor would then match the addresses in this file with the NCOA database.

NCOA VLM would identify any registered voter who moves from one address to another and uses the NCOA database to update his residential address information until 60 days before any election. The GAB would mail a notice of suspension postcard to voters who appear to have moved, informing them of registration changes and asking them to confirm these changes. Any undeliverable postcards would result in the voter's inactivation.

Alternative Three: NCOA-Mass Mailing Hybrid

The third alternative is a combination of using the NCOA database and mass mailings to conduct VLM (henceforth "hybrid option.") This alternative would act as a straightforward combination of both and follow the timelines under each individual option. The NCOA portion would inactivate movers at least twice per year, but not 60 days before any election, while the four-year mass mailings portion would inactivate voters who have not used the NCOA to update any potential address changes nor voted in two full election cycles. This option would theoretically inactivate more voters from the rolls than either option on its own. However, the number of mailings required under this alternative would involve higher costs.

The Costs of Voter List Maintenance

We divided the cost of VLM into seven categories: startup costs, the cost of contracting with an NCOA^{Link} provider, the cost of printing postcards, the cost of mailing postcards, the cost of processing postcards after they have been mailed, the cost of failing to inactivate a voter who has moved (Type I error), and the cost of incorrectly inactivating a voter who should not have been inactivated (Type II error). We provide a brief introduction to each type of cost below. For a more thorough discussion of our estimates, please see the appropriate appendices.

Startup Costs

There are no startup costs for the current policy. However, startup costs are a major component of the NCOA and the hybrid option. In order to utilize the NCOA data in the SVRS, the GAB would have to create a digital interface within the SVRS to process the data received from the NCOA vendor after the entirety of Wisconsin's voter registrations is compared with the NCOA database. Upon receiving these data, the GAB would use a system for inputting these data into the SVRS and have the voter registrations updated automatically. In the absence of a digital interface in SVRS, the GAB would incur substantial staff costs to update each individual voter record. Based on our research, we estimate the startup costs to be $14,000 for the alternatives to current policy.

NCOA Contract

Because the USPS does not make the NCOA database readily available to clients, if the State of Wisconsin elects to implement a VLM procedure relying on this database, it would have to contract with a third party to provide a list of voters who have moved. While the GAB may

rely on other state agencies, such as the Wisconsin Department of Administration, to provide access to the NCOA list the annual costs of this transaction would likely be prohibitive. It is probable that the GAB would contract with a private vendor to provide these services. Therefore, to estimate this cost, we use the amount expended by the Minnesota Secretary of State in accessing the NCOA database to conduct VLM on a voter roll of similar size to Wisconsin's. Minnesota's contract costs the state $11,500 every two years. While Minnesota checks its list once per month, instead of once every six months, we expect $11,500 to be a reasonable upper bound for the NCOA policy alternatives.

Printing and Postage Costs for Mailing Postcards

Printing and mailing "Notice of Suspension of Registration" postcards is another cost component of VLM. Under current policy, the GAB sends postcards to all registrants who failed to vote in the previous two general elections. Under the NCOA alternative, the GAB would mail postcards only to voters identified in the NCOA matching process. Under the hybrid option, the GAB would send postcards to registrants who failed to vote in the previous two general elections and to those who were identified in the NCOA matching process. Our analysis suggest that the number of postcards sent under the hybrid option would be greater than the other two alternatives. However, the GAB would send approximately the same number of postcards under the NCOA alternative and current policy.

For each policy alternative, the GAB would contract with private vendors for printing postcards. Because the GAB prints a large number of postcards, it qualifies for discount bulk rates. We estimate future costs of printing based on printing costs provided by the GAB for

years 2008 and 2010, in which the average unit cost of printing a postcard was $.0365 (Appendix 5.2.)

In addition, the GAB contracts with private vendors for its mailing. Because it mails a large number of postcards, the GAB is able to send most postcards at discount presort (bulk) mailing rates. However, some mailings cannot be sent at the discount presort rate and thus must be sent at the full postcard rate. In addition, a small number of postcards during each VLM cycle are mailed internationally. We estimate future postage costs based on the percentages of each type of mailing --- bulk, full rate, and international --- that the GAB sent in 2012.

Staff Cost of Processing Cards

We estimate the total cost of processing postcards after they have been mailed. We assume that all postcards will either be returned by the voter requesting continuation, returned by the USPS as undeliverable, or not returned. For postcards returned requesting continuation, municipal clerks must update the voter's status accordingly in the SVRS.

Postcards that are undeliverable as addressed are returned to municipal clerks. Before the municipal clerks inactivate the voter's record in the SVRS, they may conduct additional research to ensure the postcard was sent to the correct address, that the individual named has in fact relocated from the address of record, or that there are no extenuating circumstances that would warrant keeping an individual on the voter roll despite inactivity. For this reason, when surveyed, municipal clerks reported that it takes longer to process an undeliverable postcard than to process a request for continuation (see Appendix 7).

Additionally, 30 days after the date of mailing, the GAB inactivates the voter registration of individuals whose postcards have not been returned. This process is simply a query against the

SVRS database, which results in negligible staff costs. Therefore, we estimate the cost of processing an unreturned postcard to be zero.

Type I Error Cost

In this analysis, we defined a Type I error as the failure to inactivate a voter who no longer resides at the address listed on their voter registration. Under current policy, this type of error occurs whenever a voter fails to notify the municipal clerk of his relocation from the voting jurisdiction, and continues until the ineligible voter is inactivated from the voter rolls. Because the cost of a Type I error is primarily the cost to municipal clerks of printing longer poll books on Election Day, the costs accrue each election until the error is resolved. The marginal cost of a Type I error is estimated as the cost of printing a longer poll book. Errors were quantified by subtracting the number of movers identified each year from the total number of movers.

Type II Error Cost

We define Type II error as incorrectly inactivating the registration of a voter who has not moved. Under the mass mailings alternative, a Type II error occurs when an active voter is erroneously sent a postcard and subsequently marked as inactive for failing to return the postcard. This voter is unaware that his or her voter registration had been changed and would only learn of the situation when he or she shows up at the polls intending to cast a vote. He or she would then need to spend time retrieving appropriate documents from home before reregistering at the polling place. We quantify the number of registrants affected by Type II errors as a fraction of the number of continuation postcards returned to municipal clerks. We monetize the cost of reregistering based on the time it takes the voter to reregister, the cost of

driving to and from home to retrieve documents, and municipal clerks' staff time associated with processing reregistrations.

Results: Net Present Benefits

We present the calculated net present benefits of both of the alternatives relative to current policy in Table 3. These equations discount costs and benefits over a ten-year period, as this was the longest period of time that we felt confident a policy would remain in effect. Additionally, in our consultations with the GAB, our client indicated it was interested in a ten-year timeframe for this cost-benefit analysis.

For a more in-depth discussion of our analysis, see Appendix 10.

Table 3. Expected Net Present Benefits Relative to Current Policy
Discounted Over Ten Years

Category	NCOA Mailing	NCOA and Mass Mailings
Costs to GAB		
Startup Costs	-$14,000	-$14,000
NCOA Contract	-$49,000	-$49,000
Printing and Mailing Costs	$7,000	-$238,000
Other Costs		
Processing Costs	$274,000	$149,000
Type I Errors	$110,000	$176,000
Type II Errors	$254,000	$34,000
Net Present Value of Costs	$582,000	$58,000

Establishing a Baseline: Costs of Current Policy

In establishing a baseline for our analysis, we estimated the total net present value of costs of current policy to be roughly $1,392,000, discounted over a 10-year period. This was a higher cost than either of the two policy alternatives, giving each of them positive net benefits.

Of this baseline cost, however, the GAB would only bear $348,000 in the form of printing and mailing costs. Of the remainder, municipal clerks would bear $732,000 in the form of staff time required to process returned postcards and increased poll book length. The remaining $313,000 would be borne by both municipal clerks and voters when voters who were incorrectly inactivated attempt to reregister.

Net Benefits of the NCOA Alternative

According to our projections, implementing the NCOA alternative would lead to net present benefits of roughly $582,000 over a ten-year period. The main source of these benefits would take the form of cost savings for local clerks, as they would most likely receive fewer returned postcards. Additionally, municipal clerks would in general have to print shorter poll books, because while this policy option would eliminate fewer people over all it would eliminate them much more quickly than under the status quo. A small portion of these savings to local clerks would, however, be offset by slightly higher costs to the GAB in the form of an NCOA contract and project startup costs. Specifically, local clerks would save $384,000, while the GAB would incur roughly $56,000 in additional costs. Additionally, local clerks and voters would save roughly $254,000 because fewer people would likely be incorrectly inactivated.

Costs and Benefits of the Hybrid Alternative

According to our projections, implementing the hybrid policy alternative may lead to moderate net benefits of $58,000 over a ten-year period. Like the NCOA option, these benefits would almost entirely accrue as cost savings to local clerks both in the form of less staff time committed to process returned postcards and of shorter poll books. Unlike the NCOA option,

however, the additional costs to the GAB of conducting an extra mailing are substantial to the point that they almost completely offset the cost savings to local clerks. Specifically, local clerks would save roughly $324,000 while the GAB would be responsible for roughly $300,000 in extra costs. An additional $34,000 in cost savings would accrue as a result of incorrectly eliminating fewer voters.

Monte Carlo Simulation and Sensitivity Analysis

We employed a Monte Carlo simulation to examine the robustness of our estimates given variations in some of the parameters we used in our projections. Assigning various probable ranges to our uncertain parameters and then repeating our analysis allowed us to calculate the projected net value of the policy alternatives for a wide range of possible situations. Specifically, our Monte Carlo analysis calculated the net value for each policy alternative over 10,000 random draws and then aggregated the results to find a projected mean and range. For specific results of this sensitivity analysis, please see Appendix 13.1.

The results of this analysis showed that, for the assumed ranges of parameters, the finding that an NCOA-based mailing has the lowest total net present value of costs is robust in all circumstances. The sensitivity analysis also revealed that the difference in the net present value of costs between the current policy and the hybrid alternative is statistically insignificant.

Limitations

While we believe our analysis of these policy alternatives is sound, there are some limitations to our methodology that may have an effect on the overall costs of the policy

alternatives. We address some of these limitations and describe the efforts we have employed to mitigate them.

In conducting this analysis, we assumed that the current voter roll is error-free. We made this assumption in order to simplify accounting for errors, especially with regard to the hybrid option. One additional consequence of this assumption, however, is to increase the number of Type I errors under current policy. Because current policy requires inactivity for at least four years before a record can be inactivated, a voter who moves during the first year of our analysis will not be inactivated until at least year five. In order to control for this effect, we conducted a sensitivity analysis assuming that the number of Type I errors is reduced to a baseline level every two years. Using this method to account for errors, however, decreased net present costs by only $136,000, which is not large enough affect the overall results of our analysis. (See Appendix 8.1.)

An additional concern arose during our attempts to assess the time costs of processing undeliverable postcards and requests for continuation. During the course of our survey of municipal clerks, there were outliers in the data as well as comments from one respondent that indicated processing time for undeliverable postcards and requests for continuation may be higher than indicated based on the mean of survey responses. If this is the case, then the cost of processing each postcard may be significantly higher than reported above. We believe that increasing the cost of processing each postcard would only further increase the cost difference between the NCOA-only policy alternative and the other two alternatives and would, therefore, not affect the overall policy recommendation.

Furthermore, under the hybrid alternative, our level of confidence in projecting the number of inactivity mailings is low. In the above analysis, we assumed that conducting a

mailing based on the NCOA would only affect those postcards that would have been returned undeliverable under current policy. In view of the length of time between the relocation of a voter and his identification during VLM, it is difficult to say if this would actually be the case. Therefore, if the NCOA were better able to identify inactive voters than the assumptions of this analysis suggest, the overall costs of this alternative would be lower, because fewer inactivity mailings would be required. However, it is impossible to know if this is the case without additional data.

In considering the cost of Type I and Type II errors, we made the deliberate decision to include only administrative costs and costs accruing to specific voters while excluding costs to collective groups of voters and to society as a whole. Regarding Type II errors, the major cost excluded from this analysis is the cost to society of voters who do not complete reregistrations and so do not vote. While the cost of a disenfranchised voter may in fact be substantial, the inability to identify a reliable shadow price necessitated removing this from consideration. Similarly, with respect to Type I errors, there is the possibility that inaccurate poll book entries may be used to perpetrate voter fraud. However, in view of the small number of prosecutions of voter fraud and their indirect connection to VLM procedures, we were not able to establish a reliable inclusive cost of Type I errors.

Finally, concerns arose during our estimation of the number of Type II errors. No data exist within the GAB system that would allow us to assess the prevalence of Type II errors under the current policy. Furthermore, information of this nature was not readily available from other states that use VLM procedures similar to those employed in Wisconsin, nor is there a body of academic research on the topic. As a result, our attempts to approximate a baseline for comparing the costs of incorrectly inactivating a voter were highly uncertain. Although we

believe that the number of continuation requests received is the most solid basis for these estimates, further research beyond what is possible with our available resources would be needed to increase substantially the certainty of our cost estimates.

Recommendation

Based on the results of our analysis, we recommend that the GAB implement the NCOA-based alternative. Although it involves marginally higher costs to the GAB than current policy, the time savings at the municipal level would be substantial enough to far outweigh the additional expenditure. Furthermore, although the current system is, in theory, better able to inactivate ineligible voters, the high cost of distributing postcards to a large number of voters who may not have moved, combined with the long period of time it takes to identify someone who has moved, neutralizes this expected benefit relative to the other alternatives. In addition, while the NCOA-based option would fail to identify a substantial number of movers, the number of these movers and the associated costs of failing to inactivate them would likely be too low to justify a supplemental biennial mass mailing. Although our analysis does not rule out the possibility that supplemental mailings of much lower frequency may be justified, as the alternatives are framed here and within the timeframes examined, a program of NCOA-based mailings represents the most efficient use of resources.

CLERK
MUNICIPAL NAME
STREET ADDRESS
CITY, STATE, ZIP CODE

OFFICIAL ELECTION MAIL
Authorized by the U.S. Postal Service

Bulk
Mail
Permit #

Return Service Requested

Municipality Name - Ward #
County Name
Congressional District #

NOTICE OF SUSPENSION OF REGISTRATION

VOTER NAME
STREET ADDRESS
CITY, STATE ZIP CODE

Return
Postage
Required

CLERK
MUNICIPALITY NAME
STREET ADDRESS
CITY, STATE, ZIP CODE

NOTICE OF SUSPENSION OF REGISTRATION

You are hereby notified that your voter registration will be suspended, according to state law, for failure to vote within the previous 4-year period, unless you apply for continuation of your registration within 30 days. You may continue your registration by signing the statement on the other side of this postcard and returning it to your municipal clerk's office by mail or in person.

If you have changed your residence or changed your name, please contact your municipal clerk and complete a new voter registration form. Municipal Clerk contact information can be found on the G.A.B. website: gab.wi.gov/clerks/directory

If you have any questions regarding this notice please contact the G.A.B. Help Desk at (608) 261-2028 or gabhelpdesk@wi.gov.

APPLICATION FOR CONTINUATION OF REGISTRATION

I hereby certify that I still reside at the address listed below and apply for continuation of registration.

Voter Name:
Street Address:
City, State and Zip:

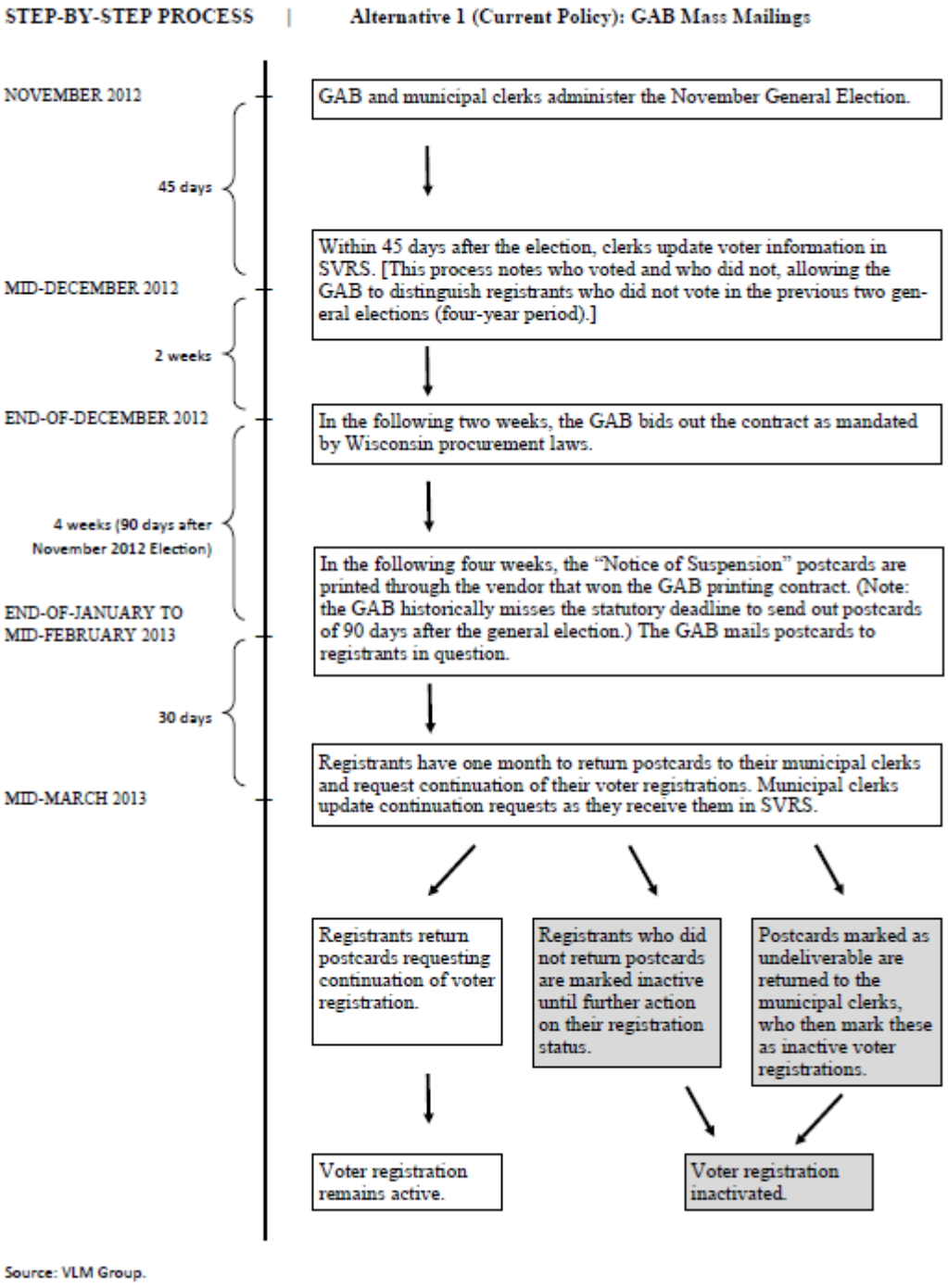
Signature: _____ Date _____

If you have changed your residence within the State of Wisconsin, or changed your name, YOU SHOULD NOT SIGN the above statement and are directed to re-register at **My Vote Wisconsin** website: ***myvote.wi.gov.*** Choose your voter category. Enter your name and date of birth. Select **Update Voter Information** and complete the Voter Registration process.

MUNICIPALITY WITH HINDI (JURISDICTION)
Voter Number
Mailing ID Barcode
Mailing ID Number

Figure 1: VLM "Notice of Suspension of Registration" Postcard

Figure 2: Diagram of Current Policy Process



Source: VLM Group.

Figure 3: USPS Change-Of-Address Form

UNITED STATES POSTAL SERVICE®

National Customer Support Center

Address Change Service Application — OneCode ACS

OneCode ACS® Contact Information

Company Name		Doing Business As *(DBA)* Company Name	
Contact		Attention *(Department/Division/Floor)*	
Street Address		Apt./Suite Number	Telephone Number *(Include area code)*
City	State	ZIP + 4®	Extension
Contact E-mail Address	Centralized E-mail Address		Fax Number *(Include area code)*

OneCode ACS Billing Information

Company Name		Taxpayer ID	
Contact		Attention *(Department/Division/Floor)*	
Street Address		Apt./Suite Number	
City	State	ZIP + 4	
Telephone Number *(Include area code)*	Extension		
Fax Number *(Include area code)*	Billing E-mail Address		

OneCodeACS Mailpiece Return Address

Street Address		Apt./Suite Number	
City	State	ZIP + 4	

OneCode ACS Fulfillment

Data fulfillment for OneCode ACS is provided daily via download from our secure web site, providing that ACS transactions are available. PS Form 1357-W, *Web Access Request*, must be completed and submitted with this application. The PS Form 1357-W can be accessed at *http://www.usps.com/forms/_pdf/ps1357w.pdf.*

Publication 8B, *OneCode ACS Technical Guide,* along with technical information and background regarding the Intelligent Mail® barcode, which is required to participate in OneCode ACS, is available at *http://www.usps.com/cpim/ftp/pubs/pub8b.pdf.*

Note: A return address is required on all mail that has a printed ancillary service endorsement applied. See Domestic Mail Manual (DMM®) 602.1.5.3a.

OneCode Ancillary Service

First-Class Mail®
Change Service Requested
☐ Option 1 ☐ Option 2
Address Service Requested
☐ Option 1 ☐ Option 2

Standard Mail®
☐ Change Service Requested
☐ Address Service Requested

Periodical
☐ Option 1 ☐ Option 4
☐ Option 2 ☐ Option 5
☐ Option 3 ☐ Option 6
☐ Address Service Requested

OneCode ACS Mailer ID Information

Please provide your Confirm or PostalOne® Mailer ID, if you have one. If you do not have a Mailer ID, you may request one through the Business Customer Gateway at: *https://gateway.usps.com/bcg/login.htm.* Local support from your Business Mail Entry Unit (BMEU), or Mailpiece Design Analyst (MDA), is available. The USPS® BMEU Locator tool can be found at: *http://www.usps.com/ncsc/locators/find-bme.html.* The USPS MDA Locator tool can be found at: *http://pe.usps.com/mpdesign/mpdfr_mda_lookup.asp.*

Mailer ID *(USPS use only)*

Mailpiece/Mailing List Name	
Confirm or PostalOne Mailer ID	
ACS Participant Code	

Authorization

I hereby authorize the United States Postal Service® to provide change-of-address information for the mailpiece title(s) listed, under the prescribed terms and conditions of ACS. I understand that OneCode ACS is not a guaranteed service. I also understand any unreadable and/or incorrect IM™ barcode information such as the Service Type and Mailer Identifier, in conjunction with the printed literal endorsement, if applicable, may produce unintended results that the USPS will not be held liable for.

Name *(Please print clearly)*	Title	
Signature		Date Signed *(MM/DD/YYYY)*

Complete this application and mail, email or fax to:

ACS Dept
National Customer Support Center
United States Postal Service
6060 Primacy Pkwy Ste 101
Memphis TN 38188-0001

FAX: 901-821-6204
E-mail: acs@usps.gov
Telephone: 877-640-0724

PS Form **3573,** June 2009

Privacy Notice: Our Privacy Policy is available at *http://www.usps.com/privacyoffice/privacypolicyhighlights.htm*

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2012-2013 Four-Year Voter Record Maintenance Statistics by County, Compiled by the Wisconsin Government Accountability Board (GAB) on May 16, 2013.

Appendix 1: Political Implications of VLM

VLM procedures have been fiercely debated by policy-oriented organizations. Proponents suggest that VLM yields more accurate voter lists and reduces administrative costs (Brennan Report 2008). However, opponents of maintenance systems argue that the process is error-prone, a waste of taxpayer dollars, erodes voter confidence, and challenges the integrity of elections (Pew 2012). In addition, VLM may be conducted with little transparency or oversight. Poor matching criteria can inadvertently inactivate active voters, forcing them to re-register on Election Day. Registrants may not be notified of their removal, leading to disenfranchisement (Brennan Report 2008). Furthermore, removal practices raise concerns regarding social justice because Hispanic and African American voters may disproportionately affected (Brennan Report 2008). A state's elections agency must consider these factors when determining the procedures it uses in VLM.

This is an important cost-benefit analysis because VLM is mandated by the federal government. The National Voter Registration Act of 1993 (NVRA) requires states to maintain accurate and up-to-date voter registration lists in accordance with their standards for removal.

Sources:

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Appendix 2: Wisconsin's Statutory Language regarding Voter List Maintenance

Wisconsin Statute §6.50 contains the language pertaining to Voter List Maintenance. Of particular importance to this analysis is subsection 6.50(8), which permits municipalities to utilize the US Postal Service's National Change of Address database to update voter lists.

6.50 Revision of Registration List

(1) Within 90 days following each general election, the municipal clerk or board of election commissioners of each municipality shall examine the registration records and identify each elector who has not voted within the previous 4 years if qualified to do so during that entire period and shall mail a notice to the elector in substantially the following form:

"NOTICE OF SUSPENSION OF REGISTRATION
You are hereby notified that your voter registration will be suspended, according to state law, for failure to vote within the previous 4-year period, unless you apply for continuation of your registration within 30 days. You may continue your registration by signing the statement below and returning it to this office by mail or in person.

APPLICATION FOR CONTINUATION OF REGISTRATION
I hereby certify that I still reside at the address at which I am registered and apply for continuation of registration.

Signed ....

Present Address ....

If you have changed your residence within this municipality or changed your name, please contact this office to complete a change of name or address form.

[Office of clerk or board of election commissioners

Address

Telephone]".

(2) The municipal clerk or board of election commissioners shall change the registration of all notified electors under sub. (1) who have not applied for continuation of registration within 30 days of the date of mailing of the notice of suspension from eligible to ineligible status.

(3) Upon receipt of reliable information that a registered elector has changed his or her residence to a location outside of the municipality, the municipal clerk or board of election commissioners shall notify the elector by mailing a notice by 1st class mail to the elector's registration address stating the source of the information. All municipal departments and agencies receiving information that a registered elector has changed his or her residence shall notify the clerk or board of election commissioners. If the elector no longer resides in the municipality or fails to apply for continuation of registration within 30 days of the date the notice is mailed, the clerk or board of election commissioners shall change the elector's registration from eligible to ineligible status. Upon receipt of reliable information that a registered elector has changed his or her residence within the municipality, the municipal clerk or board of election commissioners shall

transfer the elector's registration and mail the elector a notice of the transfer under s. 6.40 (2). This subsection does not restrict the right of an elector to challenge any registration under s. 6.325, 6.48, 6.925, 6.93, or 7.52 (5).

(4) The municipal clerk or board of election commissioners shall change the registration of deceased electors from eligible to ineligible status by means of checking vital statistics reports. No notice need be sent of registration changes made under this subsection.

(5) The registration of any elector whose address is listed at a building which has been condemned for human habitation by the municipality under s. 66.0413 (1) (j) shall be investigated by the municipal clerk or board of election commissioners. If the clerk or board of election commissioners can find no reason why the registration of such an elector should not be changed from eligible to ineligible status, the clerk or board of election commissioners shall change the elector's registration status. If the elector has left a forwarding address with the U.S. postal service, a notice of change in status shall be mailed by the clerk or board of election commissioners to the forwarding address.

(6) The municipal clerk, upon authorization by an elector, shall change the elector's registration from eligible to ineligible status.

(7) When an elector's registration is changed from eligible to ineligible status, the municipal clerk shall make an entry on the registration list, giving the date of and reason for the change.

(8) Any municipal governing body may direct the municipal clerk or board of election commissioners to arrange with the U.S. postal service pursuant to applicable federal regulations, to receive change of address information with respect to individuals residing within the municipality for revision of the elector registration list. If required by the U.S. postal service, the governing body may create a registration commission consisting of the municipal clerk or executive director of the board of election commissioners and 2 other electors of the municipality appointed by the clerk or executive director for the purpose of making application for address changes and processing the information received. The municipal clerk or executive director shall act as chairperson of the commission. Any authorization under this subsection shall be for a definite period or until the municipal governing body otherwise determines. The procedure shall apply uniformly to the entire municipality whenever used. The procedure shall provide for receipt of complete change of address information on an automatic basis, or not less often than once every 2 years during the 60 days preceding the close of registration for the partisan primary. If a municipality adopts the procedure for obtaining address corrections under this subsection, it need not comply with the procedure for mailing address verification cards under subs. (1) and (2).

Appendix 3.1: Cost-Prohibitive Municipal Policy Alternatives

Below are frequency tables of the total number of postcards sent at the municipal and county levels. Table 3.1-1 shows that of the 1,912 voting jurisdictions in the state of Wisconsin (1,852 municipalities plus 60 main jurisdictions), almost 50 percent sent less than 40 postcards to registrants, with 78 percent sending fewer than 100 postcards. These summary statistics alone suggest that conducting VLM using NCOA at the municipal-level would be inefficient given the low number of postcards sent in previous years. Similarly, Table 3.1-2 shows that 22 of the 72 counties sent fewer than 1,000 postcards. Thus, we decided to replace the two local level alternatives with a third state level option. The proposed third alternative is a hybrid of the mass-mailing and NCOA alternatives.

Table 3.1-1: Number of Postcards Sent After the 2012 General Election, by Municipal-Level

Range	Number of Municipalities	Percent of All Municipalities	Number of Postcards Sent	Percent of Total Postcards Sent
0 to 19	408	21.35	4294	1.43
20 to 39	522	27.32	15389	5.13
40 to 59	301	15.75	14696	4.90
60 to 79	163	8.53	11144	3.72
80 to 99	99	5.18	8827	2.94
100 to 249	234	12.24	35564	11.86
250 to 499	95	4.97	32412	10.81
500 to 999	46	2.41	30631	10.22
1000 to 7000	41	2.15	89042	29.71
over 7000	2	0.10	57749	19.27
Total	1911	--	299748	--

Source: 2012-2013 Four-Year Voter Record Maintenance Statistics by Municipality, Compiled by the Wisconsin Government Accountability Board (GAB) on May 16, 2013.

Table 3.1-2: Number of Postcards Sent After the 2012 General Election, by County-Level

Range	Number of Counties	Percent of All Counties	Number of Postcards Sent	Percent of Total Postcards Sent
300 to 999	22	30.56	15465	5.16
1000 to 1999	14	19.44	19552	6.52
2000 to 4999	22	30.56	70811	23.62
5000 to 9999	9	12.50	66861	22.31
over 10000	5	6.94	127059	42.39
Total	72	--	299748	--

Source: 2012-2013 Four-Year Voter Record Maintenance Statistics by County, Compiled by the Wisconsin Government Accountability Board (GAB) on May 16, 2013.

Appendix 3.2.1: Historical Inadequacy of Municipal-Level VLM

While this is a cost-benefit analysis, not a policy analysis, it is nonetheless important to discuss briefly the practicality of returning to municipal-level Voter List Maintenance. In 2005, the Wisconsin Legislative Audit Bureau (LAB) issued a report analyzing, among other things, how municipalities were conducting Voter List Maintenance, a practice mandated by state statute to take place at the municipal level.

In 2005, the Statewide Voter Registration System (SVRS) had not yet been introduced, and voter list maintenance was still in the hands of municipal clerks. The LAB's report found that "85.3% of municipalities reported inactivating or removing the names of electors who have not voted within the last four years." This report also stated that "only 71.4% of the municipalities responding to [their] survey sometimes or always [notified] voters before removing their names from registration lists" (p. 42). In other words, there was significant noncompliance among municipal clerks before the GAB took over VLM for the state. In addition to the cost concerns, based on historical evidence, the likelihood that municipal clerks would not conduct VLM properly must also be considered.

Source:

Legislative Audit Bureau. "An Evaluation: Voter Registration." September 2005.

Appendix 3.2.2: Legislative Audit Bureau reports on VLM

Wisconsin's Legislative Audit Bureau (LAB) is a non-partisan legislative service agency created to assist the Legislature in maintaining effective oversight of state operations. The LAB released two reports regarding the administration of elections before the GAB assumed the responsibility for updating voter registrations in the SVRS. The first report, released in 2005, is entitled "An Evaluation: Voter Registration" and evaluates the voter registration system in Wisconsin. The second report, released in 2007, is entitled "An Evaluation: Compliance with Election Laws" and evaluates state and local governments' compliance with election laws. The reports found significant problems with the administration of voter registration and list maintenance through municipal clerks' offices. These reports highlight some of the difficulties a centralized election's agency faces in overseeing the voter registration and voter list maintenance operations of over 1,800 municipal clerks.

The 2005 report examines the state of Wisconsin's voter registration and list maintenance before federal laws required all states to use a computerized statewide registration system starting in January 2006. The report states that "current voter registration practices are not sufficient to ensure the accuracy of voter registration lists used by poll workers or to prevent ineligible persons from registering to vote." The LAB found that, of the municipal clerks surveyed, 46.0 percent did not send address verification cards to individuals that registered by mail or on Election Day, foregoing a significant step in the verification process. Furthermore, the LAB found that 14.7 percent of these clerks failed to update their voter lists to inactivate voters, as required by law. The report cites three major sources of problems from voter list maintenance: the patchwork of requirements regarding voter registration that is confusing to clerks, poll workers, and voters; inconsistency in the use of verification cards; and insufficient efforts to inactivate electors from the voter lists, resulting in poorly maintained lists.

The 2007 report examines the state and local governments' compliance with election laws. In regards to voter list maintenance, the LAB found that the statewide voter registration system, established to comply with the federal Help America Vote Act (HAVA) of 2002, posed significant difficulties for municipal clerks. Among the report's recommendations are a request for efforts to match data in the SVRS with data from the Department of Corrections, Department of Health and Family Services, and the Department of Transportation and to train municipal clerks in how to use information from data matches. The report also recommends the GAB to report to the Joint Legislative Audit Committee its progress in promulgating administrative rules for training local election officials and clarifying their responsibilities in registering voters.

Sources:

Legislative Audit Bureau. "An Evaluation: Compliance with Election Laws." November 2007.

Legislative Audit Bureau. "An Evaluation: Voter Registration." September 2005.

Appendix 3.3: Municipal Postage Costs

Postcards are a type of First-Class Mail, and thus can qualify for postage discounts. For First-Class Mail such as postcards, municipalities must mail a minimum of 500 pieces to qualify for a bulk mailing postage discount through the United States Postal Service. Under each alternative, the GAB will send well in excess of 500 pieces. In 2012, the GAB received a presort discount rate on over 67 percent of postcards. See Table 3.3-1.

Table 3.3-1				
Rate type	Postage cost	Number of postcards mailed	Rate	Percent
Discount presort	$47,110	203,073	$0.23	67.75
Full rate	$31,767	96,264	$0.33	32.11
Foreign/Canadian	$452	411	$1.10	0.14
Total, 2 year period	$79,329	299,748	$0.27	---

In 2012, 89 municipalities in Wisconsin mailed 500 or more postcards, accounting for approximately 59 percent of all postcards sent in 2012. See Table 2.

Table 3.3-2			
Range of postcards Mailed	Number of Municipalities	Total Number of Postcards	Percent of Total Postcards
0 to 499	1822	122326	59.19
Over 500	89	177422	40.81
Total	--	299748	--

Approximately 41 percent of Wisconsin voters therefore live in municipalities that likely would not be able to receive a discount rate on postcard mailings. Thus, under the municipal mass mailing alternative, approximately 41 percent of the 203,073 discount presort envelopes sent in 2012, a total of 82,873, would be sent at the full $0.33 rate, instead of at the discount presort rate. See Table 3.3-3.

Table 3.3-3		
No. of discount presort postcards, 2012	% at full rate under municipal option	No. of postcards formerly at discount rate, at full rate under municipal option
203,073	40.81	82,873

In total, this would have cost the state an additional $8,000 in 2012, an increase of approximately 17 percent. See Tables 3.3-4 and 3.3-5.

Table 3.3-4			
Number of postcards at discount rate under municipal option	Cost of discount presort postage ($0.23/piece)	Number of additional postcards at full rate under municipal option	Cost of full rate postage ($0.33/piece)
120,200	$28,000	82,873	$27,000

Table 3.3-5			
Estimated postage cost, municipal option	2012 GAB presort postage cost	Estimated Additional Postage Cost	Percent increase
$55,000	$47,000	$8,000	17

This percent increase should be slightly higher under the NCOA-only alternative (as fewer postcards would be sent, so fewer municipalities would be entitled to bulk rates), and slightly lower under the NCOA-mass mailing alternative (as more postcards would be sent, so a greater number of municipalities would qualify for a bulk rate.)

Finally, we realize this estimate may be biased slightly upward, as large cities such as Madison and Milwaukee are more likely to have transient voting populations than small villages and towns. However, this is illustrative of the excessive postage expense that municipalities would have to bear should they be required to conduct voter list maintenance on their own.

Sources:

Bell, Brian. Elections Data Manager, Wisconsin Government Accountability Board. Personal Communication. 28 October 2013.

"Business Mail 101: What is Bulk Mail? Is it Right for You?" United States Postal Service. <http://pe.usps.com/businessmail101/getstarted/bulkmail.htm> Retrieved 23 November 2013.

"Business Mail 101: First Class Mail." United States Postal Service. <http://pe.usps.com/businessmail101/mailcharacteristics/cards.htm> Retrieved 23 November 2013.

Appendix 3.4: Municipal Printing Costs

The cost of printing postcards varies based on the number of postcards sent. Entities that send large numbers of mailings are entitled to bulk rates. Because the GAB sends out larger quantities of postcards than municipalities would under any municipal alternative, its per-postcard rate will be lower. Overall, we estimate the total change in printing cost under any municipal option to be over 329 percent.

Table 3.4-1 shows the printing rates paid by the GAB in 2008, 2010, and 2012. Intuitively, the more postcards the GAB sent, the lower its per-postcard rate.

Table 3.4-1

Year	Printing cost	Postcards sent	Cost per postcard
2008	$8,692	313,205	$0.03
2010	$10,779	240,225	$0.05
2012	$11,163	299,748	$0.04

We contacted local copy shops across the state to inquire as to their various bulk printing rates. Table 3.4-2 shows the results of our contacts.

Table 3.4-2

Name	Per-postcard rate, 50 postcards	Per-postcard rate, 100 postcards	Per-postcard rate, 500 postcards	Per-postcard rate, 1000 postcards
Copy Shop A	$0.58	$0.04	$0.36	$0.34
Copy Shop B	$1.80	$0.95	$0.21	$0.16
Copy Shop C	$1.08	$1.60	$0.19	$0.17
Copy Shop D	$0.38	$0.28	$0.20	$0.18
Copy Shop E	$1.08	$1.60	$0.19	$0.17
Average Rate	$0.98	$0.89	$0.23	$0.20

As Table 3.4-2 shows, the lowest price per postcard at the lowest bulk rate is 16 cents, significantly higher than the highest average GAB bulk rate of $.05. As an illustration, Table 3.4-3 shows the increased costs that the state would have borne (if we aggregate all municipalities' costs) had municipalities conducted VLM in 2012 at the lowest possible municipal bulk rate that we found. The increase in cost of 336 percent across the state demonstrates that under any municipal option, the printing costs alone far exceed the GAB's printing costs.

Table 3.4-3

Number of postcards sent	Lowest municipal bulk rate	Approx. cost at municipal bulk rate	Approx. 2012 GAB cost	Additional printing cost	Percent increase
299,748	$0.16	$48,000	$11,000	$37,000	336

Sources:

Bell, Brian. Elections Data Manager, Wisconsin Government Accountability Board. Personal Communication. 28 October 2013.

Print Shop Survey in Wisconsin, Administered via email and phone from October 28 to November 8, 2013.

Appendix 3.4.1: Survey of Wisconsin Copy Shops for Estimating Printing Costs for Municipalities

To estimate the cost of printing poll books and postcards, we decided to call copy shops located near municipal clerk offices for price quotes. Twenty municipalities were selected based on a stratified sample. That is, the 1,852 municipalities in the state were sorted into twenty bins according to the number of postcards sent in 2013. The municipality with the highest ratio of postcards per voting population was selected from each bin.

Two members of our group then entered the addresses of the 20 municipal clerk offices into Google Maps to find the nearest copy shop to call and obtain prices for printing poll book sheets and postcards of various quantities. Of the 20 copy shops contacted, nine provided the desired quotes for poll book printing and five provided the desired quotes for postcard printing. The copy shops we contacted may not be those that municipal clerks patron but do provide a good estimate of the printing costs should VLM occur at the local level. Table 3.4.1-1 summarizes this information.

Table 3.4.1-1: Printing Prices for Poll Books and Postcards, Obtained from Surveying Local Copy Shops Across 20 Municipalities

County	Municipality	Postcards Sent in 2013	Percent of Postcards per Voting Population	Retrieved Price for Printing Poll Books (per sheet)	Retrieved Price for Printing Postcards (per sheet)
WASHBURN COUNTY	TOWN OF FROG CREEK	15	14	X	X
RICHLAND COUNTY	VILLAGE OF CAZENOVIA	34	14	X	--
MARINETTE COUNTY	VILLAGE OF WAUSAUKEE	58	13	--	--
SHAWANO COUNTY	TOWN OF BARTELME	75	13	X	--
FOREST COUNTY	TOWN OF BLACKWELL	86	32	--	--
POLK COUNTY	TOWN OF ST. CROIX FALLS	102	11	X	--
ST. CROIX COUNTY	VILLAGE OF ROBERTS	143	12	--	--
TREMPEALEAU COUNTY	CITY OF GALESVILLE	152	13	X	--
WINNEBAGO COUNTY	TOWN OF OMRO	226	14	X	X
MARINETTE COUNTY	TOWN OF DUNBAR	286	33	--	--
MENOMINEE COUNTY	TOWN OF MENOMINEE	355	12	X	X
CHIPPEWA COUNTY	VILLAGE OF LAKE HALLIE	471	9	--	--
ASHLAND COUNTY	CITY OF ASHLAND	598	9	--	--
KENOSHA COUNTY	TOWN OF SOMERS	731	10	--	--
GRANT COUNTY	CITY OF PLATTEVILLE	1382	13	X	X

BROWN COUNTY	CITY OF DE PERE	1695	9	--	--
DOUGLAS COUNTY	CITY OF SUPERIOR	2452	11	--	--
PORTAGE COUNTY	CITY OF STEVENS POINT	2530	11	--	--
LA CROSSE COUNTY	CITY OF LA CROSSE	5045	12	X	X
KENOSHA COUNTY	CITY OF KENOSHA	6614	9	--	--
DANE COUNTY	CITY OF MADISON	23794	12	--	--
MILWAUKEE COUNTY	CITY OF MILWAUKEE	33955	8	--	--

Tables 3.4.1-2 and 3.4.1-3 give price quotes for poll book sheets and postcards. There are 20 names on a single double-sided poll book sheet. Furthermore, there are 2 postcards in a single double-sided index sheet. Based on the number of electors in each municipality, we calculated a weighted average cost of printing one double-sided sheet to be $0.15.

Table 3.4.1-2: Poll Book Sheet Price Quotes				
Name of Copy Shop	Q=50	Q=100	Q=500	Q=1000
Copy Shop A	0.16	0.15	0.14	0.13
Copy Shop B	0.58	0.34	0.12	0.09
Copy Shop C	0.16	0.15	0.09	0.09
Copy Shop D	0.1	0.09	0.09	0.09
Copy Shop E	0.16	0.15	0.09	0.09
Copy Shop F	0.35	0.25	0.14	--
Copy Shop G	0.25	0.25	0.2	0.2
Copy Shop H	0.28	0.14	0.11	0.12
Copy Shop I	0.84	0.14	0.12	0.08
Average Cost Per Page	0.32	0.22	0.12	0.11

Table 3.4.1-3: Postcards Price Quotes				
Name of Copy Shop	Q=50	Q=100	Q=500	Q=1000
Copy Shop A	0.58	0.039	0.36	0.34
Copy Shop B	1.8	0.95	0.21	0.16
Copy Shop C	1.08	1.6	0.19	0.17
Copy Shop D	0.38	0.28	0.2	0.18
Copy Shop E	1.08	1.6	0.19	0.17
Average Cost Per Page	0.98	0.89	0.23	0.2

The following is a sample of our copy shop survey. We asked for price quotes at quantities of 50, 100, 500, and 1,000 for both poll book sheets (8.5X11 copy paper) and postcards (8.5X11 index cardstock).

1. How much does it cost to print an 8.5X11 double-sided, printed in black and white copy paper at a quantity of Q? Where Q=50, Q=100, Q=500, Q=1000.

2. How much does it cost to print an 8.5X11 double-sided, printed in black and white index cardstock cut once length wise (where the end product dimensions are 4.25X11), and then perforated in half (where the end product dimensions are 4.25X5.5) at a quantity of Q? Where Q=50, Q=100, Q=500, Q=1000.

Appendix 3.5: Municipal Option: NCOA is Cost Prohibitive

Administering NCOA^{Link} services through private vendors at the municipal level would prove to be cost prohibitive. Table 3.5-1 provides a list of NCOA^{Link} full service provider licensees and their corresponding costs.

Table 3.5-1: NCOA^{Link} Full Service Provider Licensees and Pricing	
NCOA Vendor	Costs ("M" is an additional one thousand records)
Private Vendor A	$50 minimum per file (up to 17,000) + $2.95/M records
Private Vendor B	$75 minimum per file (up to 136,000) + $.55/M records
Private Vendor C	$50 minimum + $1/M records
Private Vendor D	$100 minimum + $1.50/M records
Private Vendor E	$75 minimum + $2.65/M records

There are 1,852 municipalities in the state of Wisconsin. Under the NCOA alternative at the municipal level, all 1,852 municipalities would be required to set up an interface and contract with NCOA private vendors. Even at the lowest rate of $50, the 1,047 municipalities with a population of less than a thousand would incur approximately $53,000 to contract with private NCOA vendor.

Source:

Private NCOA Vendor Survey, Administered via email and phone. From November 11 to November 15, 2013.

Appendix 4.1: State of Minnesota Contract with NCOA Vendor

The following is the contract between the State of Minnesota and its NCOA vendor, with a two-year estimated cost of $11,520. In consultation with the Wisconsin GAB, we determined that it would use the same contract structure and seek to find the cheapest costs possible, and the Minnesota NCOA contract does this. One significant difference is that while Minnesota runs its data once per month, Wisconsin would likely run it twice per year. Because it is unclear whether this would increase or decrease the cost of the contract we elected to use this cost as the mean of a normal distribution during our Monte Carlo simulation.

Page two of the document details the SVRS data input structure that Minnesota sends to its vendor for running against the NCOA database. The GAB has stated it would use the same data structure.

Not detailed in this contract are start-up costs for the NCOA software at Minnesota Secretary of State's office. However, the State of Wisconsin Department of Administration uses NCOA and its start-up costs were $14,000. We use this as the estimated cost for the Wisconsin GAB's software and start-up costs. This is a one-time cost.

Professional and Technical Services Contract

State of Minnesota

SWIFT Contract No.: 66799

This Contract is between the State of Minnesota, acting through its Office of the Secretary of State ("State") and Lorton Data Inc whose designated business address is 2 Pine Tree Dr, Ste 302, Arden Hills 55112 ("Contractor").

Recitals

1. Under Minn. Stat. § 15.061, the State is empowered to engage such assistance as deemed necessary.
2. The State is in need of services to compare statewide voter registration data and periodic updates to the National Change of Address (NCOA) list maintained by the United States Postal Service
3. The Contractor represents that it is duly qualified and agrees to perform all services described in this Contract to the satisfaction of the State.

Contract

1. **Term of Contract**
   - 1.1 **Effective date: August 6, 2013,** or the date the State obtains all required signatures under Minn. Stat. § 16C.05, subd. 2, whichever is later. The Contractor must not begin work under this Contract until this Contract is fully executed and the Contractor has been notified by the State's Authorized Representative to begin the work.
   - 1.2 **Expiration date: June 30, 2015,** or until all obligations have been satisfactorily fulfilled, whichever occurs first.
   - 1.3 **Survival of terms:** The following clauses survive the expiration or cancellation of this Contract: 8. Indemnification; 9. State audits; 10. Government data practices and intellectual property; 14. Publicity and endorsement; 15. Governing law, jurisdiction, and venue; and 16. Data disclosure.

2. **Contractor's duties**

   The Contractor, who is not a State employee, will:

   Perform NCOA Full Service Processing (48 months) or Limited Service Processing (18 months) for voter registration records sent to the contractor by the process below, regularly on a monthly schedule. The NCOA Full Service processing (48 months) compares supplied voter names and addresses against 48 months of permanent address changes as given by individuals or families to the USPS. The NCOA Limited Service processing (18 months) compares supplied voter names and addresses against 18 months of permanent address changes as given by individuals or families to the USPS. NCOA data in this contract is defined as the set of names and addresses maintained by the United States Postal Service along with address changes supplied by either an individual or a family member using the USPS National Change of Address form.

   The scope of work will include either 18 month or 48 month NCOA processing of approximately 3 million records per month. Common exceptions to the monthly schedule will occur at the following times:

   - Processing will be required 48 days before the state primary election in even years, then not again until the day of the primary.
   - Processing may occur again 48 days before the November general election.
   - Processing would not occur in October.
   - Processing will occur on the day of a November general election, and then again when move data through the date of the November general election is available (approximately two weeks later).

   Work will include the following on a monthly basis due on the same day each month. Processing frequency may be changed at any time by OSS to a greater or lesser frequency. The contractor must be willing to accommodate processing schedule change requests from OSS. The vendor must be able to provide data processing within 2 business days of the agreed upon monthly scheduled date agreed upon by both parties. The vendor must be able to accommodate any special requests within 5 business days.

Monthly data processing plan:

1) Contractor will acquire the file provided by OSS on a specified FTP site in a format specified by OSS using secure data transfer.
2) Contractor will process the address files and return the files with updates as a result of a comparison with NCOA data. Files will be returned in a format specified by OSS.
3) Contractor will place the updated files in a specified format on an FTP site provided by the vendor. The FTP site will be capable of supporting secure data transfer.

OSS Data Formats for SVRS output file (input to contractor):

Name	Length
Record Key – unique identifier	28
Name Parsed Flag	1
Name Prefix	6
First Name	30
Middle Name	30
Last Name	40
Name Suffix	6
Address Parsed Flag	1
Urbanization	28
House Number	10
Address Pre-Directional	2
Street Name	28
Street Type	4
Address Post-Directional	2
Unit Type	4
Unit Number	8
Filler	9
CityState Parsed Flag	1
City	28
State	2
Zip	5
Zip Plus4	4
Filler	3

Vendor Data Format for NCOA output file (from vendor to OSS):

Name	Length
County (FIPS County Code)	5
MoveType (individual, family)	1
MoveDate (YYYYMM)	6
NewHouseNumber	10
NewHouseNumberSuffix	4
NewStreetPreDirectional	2
NewStreetName	50
NewStreetType	10
NewStreetPostDirectional	2
NewUnitType	5
NewUnitNumber	15
NewCityName	35
NewStateCode	2
NewZipCode	5
NewZipPlus4	4
FIPS MCD Code – Optional	8

Status (e.g., forwarding address exists)	2
COA First Name	15
COA MI	15
COA Last Name	20
COA Suffix	6

The data above must be returned in addition to the information sent. At a minimum, the Record Key (unique identifier) must be returned with any matching data.

3. **Time**
The Contractor must comply with all the time requirements described in this Contract. In the performance of this Contract, time is of the essence.

4. **Consideration and payment**

4.1 Consideration. The State will pay for all services performed by the Contractor under this Contract as follows:

(a) Compensation. The Contractor will be paid as follows:

NCOA Full Service Processing (48 months) Price per 1000 records: $0.16

Estimated quantity and pricing information for NCOA Full Service Processing:

Estimated quantity: 3,000,000 per monthly request

Estimated price per request: $ 480.00

NCOA Limited Service Processing (18 months) Price per 1000 records: $0.16

Estimated quantity and pricing information for NCOA Limited Service Processing:

Estimated quantity: 3,000,000 per month

Estimated price per month: :$480.00

Estimated price per year: $5,760.00

Estimated price for two year contract: $11,520.00

(b) Travel expenses. Reimbursement for travel and subsistence expenses actually and necessarily incurred by the Contractor as a result of this Contract will not exceed $0.00; provided that the Contractor will be reimbursed for travel and subsistence expenses in the same manner and in no greater amount than provided in the current "Commissioner's Plan" established by the Commissioner of Minnesota Management and Budget which is incorporated in to this Contract by reference. The Contractor will not be reimbursed for travel and subsistence expenses incurred outside Minnesota unless it has received the State's prior written approval for out-of-state travel. Minnesota will be considered the home state for determining whether travel is out of state.

4.2 Total obligation. The total obligation of the State for all compensation and reimbursements to the Contractor under this Contract will not exceed $12,000.00

4.3 Payment.

(a) Invoices. The State will promptly pay the Contractor after the Contractor presents an itemized invoice for the services actually performed and the State's Authorized Representative accepts the invoiced services. Invoices must be submitted timely and according to the following schedule:

Once each calendar month.

(b) Retainage. Under Minn. Stat. § 16C.08, subd. 5(b), no more than 90 percent of the amount due under this Contract may be paid until the final product of this Contract has been reviewed by the State's agency head. The balance due will be paid when the State's agency head determines that the Contractor has satisfactorily fulfilled all the terms of this Contract.

(c) *Federal funds.* (Where applicable, if blank this section does not apply.) Payments under this Contract will be made from federal funds obtained by the State through. CFDA Number 39.011. The Contractor is responsible for compliance with all federal requirements imposed on these funds and accepts full financial responsibility for any requirements imposed by the Contractor's failure to comply with federal requirements.

5 Conditions of payment

All services provided by the Contractor under this Contract must be performed to the State's satisfaction, as determined at the sole discretion of the State's Authorized Representative and in accordance with all applicable federal, state, and local laws, ordinances, rules, and regulations including business registration requirements of the Office of the Secretary of State. The Contractor will not receive payment for work found by the State to be unsatisfactory or performed in violation of federal, state, or local law.

6 Authorized Representative

The State's Authorized Representative is Matt McCollough, 180 State Office Building, 100 Rev. Dr. Martin Luther King, Jr. Blvd., Saint Paul MN 55155 or his/her successor, and has the responsibility to monitor the Contractor's performance and the authority to accept the services provided under this Contract. If the services are satisfactory, the State's Authorized Representative will certify acceptance on each invoice submitted for payment.

The Contractor's Authorized Representative is Authorized Representative: Lori Evans, Chief Financial Officer at the following business address and telephone number: Levans@lortondata.com, 612-362-0201 or his/her successor. If the Contractor's Authorized Representative changes at any time during this Contract, the Contractor must immediately notify the State.

7 Assignment, amendments, waiver, and contract complete

7.1 Assignment. The Contractor may neither assign nor transfer any rights or obligations under this Contract without the prior consent of the State and a fully executed assignment agreement, executed and approved by the same parties who executed and approved this Contract, or their successors in office.

7.2 Amendments. Any amendment to this Contract must be in writing and will not be effective until it has been executed and approved by the same parties who executed and approved the original Contract, or their successors in office.

7.3 Waiver. If the State fails to enforce any provision of this Contract, that failure does not waive the provision or its right to enforce it.

7.4 Contract complete. This Contract contains all negotiations and agreements between the State and the Contractor. No other understanding regarding this Contract, whether written or oral, may be used to bind either party.

8 Indemnification

In the performance of this Contract by Contractor, or Contractor's agents or employees, the Contractor must indemnify, save, and hold harmless the State, its agents, and employees, from any claims or causes of action, including attorney's fees incurred by the State, to the extent caused by Contractor's:

a) Intentional, willful, or negligent acts or omissions; or
b) Actions that give rise to strict liability; or
c) Breach of contract or warranty.

The indemnification obligations of this section do not apply in the event the claim or cause of action is the result of the State's sole negligence. This clause will not be construed to bar any legal remedies the Contractor may have for the State's failure to fulfill its obligation under this Contract.

9 State audits

Under Minn. Stat. § 16C.05, subd. 5, the Contractor's books, records, documents, and accounting procedures and practices relevant to this Contract are subject to examination by the State and/or the State Auditor or Legislative Auditor, as appropriate, for a minimum of six years from the end of this Contract.

10 Government data practices and intellectual property

10.1 Government data practices. The Contractor and State must comply with the Minnesota Government Data Practices Act, Minn. Stat. ch. 13, (or, if the State contracting party is part of the Judicial Branch, with the Rules of Public Access to Records of the Judicial Branch promulgated by the Minnesota Supreme Court as the same may be amended from time to time) as it applies to all data provided by the State under this Contract, and as it applies to all data created, collected, received, stored, used, maintained, or disseminated by the Contractor under this Contract. The civil remedies of Minn. Stat. § 13.08 apply to the release of the data governed by the Minnesota Government Practices Act, Minn. Stat. ch. 13, by either the Contractor or the

State.

If the Contractor receives a request to release the data referred to in this clause, the Contractor must immediately notify and consult with the State's Authorized Representative as to how the Contractor should respond to the request. The Contractor's response to the request shall comply with applicable law.

10.2 Intellectual property rights.

(a) Intellectual property rights. The State owns all rights, title, and interest in all of the intellectual property rights, including copyrights, patents, trade secrets, trademarks, and service marks in the works and documents created and paid for under this Contract. The "works" means all inventions, improvements, discoveries (whether or not patentable), databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, and disks conceived, reduced to practice, created or originated by the Contractor, its employees, agents, and subcontractors, either individually or jointly with others in the performance of this Contract. "Works" includes documents. The "documents" are the originals of any databases, computer programs, reports, notes, studies, photographs, negatives, designs, drawings, specifications, materials, tapes, disks, or other materials, whether in tangible or electronic forms, prepared by the Contractor, its employees, agents, or subcontractors, in the performance of this Contract. The documents will be the exclusive property of the State and all such documents must be immediately returned to the State by the Contractor upon completion or cancellation of this Contract. To the extent possible, those works eligible for copyright protection under the United States Copyright Act will be deemed to be "works made for hire." The Contractor assigns all right, title, and interest it may have in the works and the documents to the State. The Contractor must, at the request of the State, execute all papers and perform all other acts necessary to transfer or record the State's ownership interest in the works and documents.

(b) Obligations

(1) Notification. Whenever any invention, improvement, or discovery (whether or not patentable) is made or conceived for the first time or actually or constructively reduced to practice by the Contractor, including its employees and subcontractors, in the performance of this Contract, the Contractor will immediately give the State's Authorized Representative written notice thereof, and must promptly furnish the State's Authorized Representative with complete information and/or disclosure thereon.

(2) Representation. The Contractor must perform all acts, and take all steps necessary to ensure that all intellectual property rights in the works and documents are the sole property of the State, and that neither Contractor nor its employees, agents, or subcontractors retain any interest in and to the works and documents. The Contractor represents and warrants that the works and documents do not and will not infringe upon any intellectual property rights of other persons or entities. Notwithstanding Clause 8, the Contractor will indemnify; defend, to the extent permitted by the Attorney General; and hold harmless the State, at the Contractor's expense, from any action or claim brought against the State to the extent that it is based on a claim that all or part of the works or documents infringe upon the intellectual property rights of others. The Contractor will be responsible for payment of any and all such claims, demands, obligations, liabilities, costs, and damages, including but not limited to, attorney fees. If such a claim or action arises, or in the Contractor's or the State's opinion is likely to arise, the Contractor must, at the State's discretion, either procure for the State the right or license to use the intellectual property rights at issue or replace or modify the allegedly infringing works or documents as necessary and appropriate to obviate the infringement claim. This remedy of the State will be in addition to and not exclusive of other remedies provided by law.

11. Workers' compensation and other insurance

Contractor certifies that it is in compliance with all insurance requirements specified in the solicitation document relevant to this Contract. Contractor shall not commence work under the Contract until they have obtained all the insurance specified in the solicitation document. Contractor shall maintain such insurance in force and effect throughout the term of the Contract.

Further, the Contractor certifies that it is in compliance with Minn. Stat. § 176.181, subd. 2, pertaining to workers' compensation insurance coverage. The Contractor's employees and agents will not be considered State employees. Any claims that may arise under the Minnesota Workers' Compensation Act on behalf of these employees or agents and any claims made by any third party as a consequence of any act or omission on the part of these employees or agents are in no way the State's obligation or responsibility.

12. Debarment by State, its departments, commissions, agencies, or political subdivisions

Contractor certifies that neither it nor its principals is presently debarred or suspended by the State, or any of its departments, commissions, agencies, or political subdivisions. Contractor's certification is a material

representation upon which the Contract award was based. Contractor shall provide immediate written notice to the State's Authorized Representative if at any time it learns that this certification was erroneous when submitted or becomes erroneous by reason of changed circumstances.

13. **Certification regarding debarment, suspension, ineligibility, and voluntary exclusion**
Federal money will be used or may potentially be used to pay for all or part of the work under the Contract, therefore Contractor certifies that it is in compliance with federal requirements on debarment, suspension, ineligibility and voluntary exclusion specified in the solicitation document implementing Executive Order 12549. Contractor's certification is a material representation upon which the Contract award was based.

14. **Publicity and endorsement**
    14.1 **Publicity.** Any publicity regarding the subject matter of this Contract must identify the State as the sponsoring agency and must not be released without prior written approval from the State's Authorized Representative. For purposes of this provision, publicity includes notices, informational pamphlets, press releases, research, reports, signs, and similar public notices prepared by or for the Contractor individually or jointly with others, or any subcontractors, with respect to the program, publications, or services provided resulting from this Contract.
    14.2 **Endorsement.** The Contractor must not claim that the State endorses its products or services.

15. **Governing law, jurisdiction, and venue**
Minnesota law, without regard to its choice-of-law provisions, governs this Contract. Venue for all legal proceedings out of this Contract, or its breach, must be in the appropriate state or federal court with competent jurisdiction in Ramsey County, Minnesota.

16. **Data disclosure**
Under Minn. Stat. § 270C.65, subd. 3 and other applicable law, the Contractor consents to disclosure of its social security number, federal employer tax identification number, and/or Minnesota tax identification number, already provided to the State, to federal and state agencies, and state personnel involved in the payment of state obligations. These identification numbers may be used in the enforcement of federal and state laws which could result in action requiring the Contractor to file state tax returns, pay delinquent state tax liabilities, if any, or pay other state liabilities.

17. **Payment to subcontractors**
As required by Minn. Stat. § 16A.1245, the prime Contractor must pay all subcontractors, less any retainage, within 10 calendar days of the prime Contractor's receipt of payment from the State for undisputed services provided by the subcontractor(s) and must pay interest at the rate of one and one-half percent per month or any part of a month to the subcontractor(s) on any undisputed amount not paid on time to the subcontractor(s).

18. **Termination**
    18.1 **Termination by the State.** The State or Commissioner of Administration may cancel this Contract at any time, with or without cause, upon 30 days' written notice to the Contractor. Upon termination, the Contractor will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed.
    18.2 **Termination for insufficient funding.** The State may immediately terminate this Contract if it does not obtain funding from the Minnesota Legislature, or other funding source; or if funding cannot be continued at a level sufficient to allow for the payment of the services covered here. Termination must be by written or fax notice to the Contractor. The State is not obligated to pay for any services that are provided after notice and effective date of termination. However, the Contractor will be entitled to payment, determined on a pro rata basis, for services satisfactorily performed to the extent that funds are available. The State will not be assessed any penalty if the Contract is terminated because of the decision of the Minnesota Legislature, or other funding source, not to appropriate funds. The State must provide the Contractor notice of the lack of funding within a reasonable time of the State's receiving that notice.

19. **Non-discrimination (In accordance with Minn. Stat. § 181.59)**
The Contractor will comply with the provisions of Minn. Stat. § 181.59 which require:
"Every contract for or on behalf of the state of Minnesota, or any county, city, town, township, school, school district, or any other district in the state, for materials, supplies, or construction shall contain provisions by which the contractor agrees:
(1) that, in the hiring of common or skilled labor for the performance of any work under any contract, or any subcontract, no contractor, material supplier, or vendor, shall, by reason of race, creed, or color, discriminate against the person or persons who are citizens of the United

States or resident aliens who are qualified and available to perform the work to which the employment relates;

(2) that no contractor, material supplier, or vendor, shall, in any manner, discriminate against, or intimidate, or prevent the employment of any person or persons identified in clause (1) of this section, or on being hired, prevent, or conspire to prevent, the person or persons from the performance of work under any contract on account of race, creed, or color;

(3) that a violation of this section is a misdemeanor; and

(4) that this contract may be canceled or terminated by the state, county, city, town, school board, or any other person authorized to grant the contracts for employment, and all money due, or to become due under the contract, may be forfeited for a second or any subsequent violation of the terms or conditions of this contract."

1. State Encumbrance Verification
Individual certifies that funds have been encumbered as required by Minn. Stat. §§ 16A.15 and 16C.05

Print name: Jennifer Kurz
Signature: Jennifer Kurz
Title: Fiscal Svcs Sup Date: 8/6/13
SWIFT Contract No.: 66799

2. Contractor
The Contractor certifies that the appropriate person(s) have executed the Contract on behalf of the Contractor as required by applicable articles, bylaws, resolutions, or ordinances.

Print name: by Lori MB Evans
Signature: Lori MB Evans
Title: CFO Date: 8/13/13
Print name:
Signature:
Title: Date:

3. State Agency
With delegated authority

Print name: GARY PASER
Signature:
Title: Director of Operations Date: 8/14/13

4. Commissioner of Administration
As delegated to Materials Management Division

Print name: Sara Estrin
Signature: Sara Estrin
Title: AMS Date: 8-15-13
Print name:
Signature:
Title: Date:

Distribution:
Agency
Contractor
State's Authorized Representative – photo copy

34501

Appendix 4.2: Limitations of NCOA

Table 4.2-1 outlines the five types of residential moves as defined by the U.S. Postal Service.

Table 4.2-1	
Type of Move	**Percent of Moves (2008)**
Forwardable, confirmed new addresses – new address provided	80.92
Unconfirmed new addresses – New address not provided	1.18
Moved, left no address	13.80
PO Box Closed	3.92
Foreign Moves	0.18

Postcards would reach their intended recipients in the first two types of moves, but would be undeliverable under the last three. See Table 4.2-2.

Table 4.2-2	
Percent of postcards successfully mailed	82.1
Percent of postcards returned undeliverable	17.9

Therefore, under either NCOA alternative, approximately 18 percent of postcards would be returned to municipal clerks as undeliverable.

Further, according to MelissaData.com, the USPS NCOA database catches between 60 and 67 percent of movers. Therefore, under the NCOA-only alternative, the GAB would fail to inactivate 33-40 percent of voters who moved but did not register with NCOA.

Sources:

Avrick, David Bancroft. "How Many People Move Each Year – and Who Are They?" <http://www.melissadata.com/enews/articles/0705b/1.htm> Retrieved 27 November 2013.

United States Postal Service. "Full and Limited Service Provider NCOA$^{Link®}$ Required Text Document." 13 May 2008.

www.MelissaData.com. "Where Did My Customers Go? A Melissa Data White Paper."

Appendix 5.1: GAB Postage Costs

Table 5.1-1 lists the GAB's postage costs for 2008, 2010, and 2012. The "Average Postage Rate" is the average postage rate paid for each postcard. As the GAB currently conducts VLM every two years, the postage costs are incurred every two years.

Table 5.1-1			
Year	Total postage cost	Number of postcards mailed	Average Postage Rate
2008	$62,732.70	313,205	$0.20
2010	$50,809.56	240,225	$0.21
2012	$79,329.24	299,748	$0.27

Table 5.1-2 lists the GAB's postage costs in 2012, broken down by the type of rate paid on each type of mail.

Table 5.1-2				
Rate type	Postage cost	Number of postcards mailed	Rate	Percent
Discount presort	$47,110.02	203,073	$0.23	67.75
Full rate	$31,767.12	96,264	$0.33	32.11
Foreign/Canadian	$452.10	411	$1.10	0.14
Total, 2 year period	$79,329.24	299,748	$0.27	

For each alternative, we projected the number of total postcards that would be mailed and projected the cost of each mailing based on the rates and percentages in Table 2.

For our sensitivity analysis, as the percentages of presort and full rate mailings would likely be different from one VLM cycle to the next, we varied the percentages. However, we did not need to account for postage rate increases. Increases in postage rates have generally tracked changed in the Consumer Price Index throughout their history, such that the price of mail in 2013 dollars has not changed appreciably, and thus will not change much in the subsequent 10 years. We expect the same would hold for postcard rates.

We thank the group performing cost-benefit analysis on election-day registration for Table 5.1-3.

Table 5.1-3					
Year	Nominal Price, First Class Mail	Percent Change (nominal dollars)	Price in 2013 dollars	Percent Change (2013 dollars)	Consumer Price Index (1982-84)
1973	0.10	11.11	0.53	6.00	44.4
1974	0.10	0.00	0.47	-11.32	49.3
1975	0.13	30.00	0.57	21.28	53.8

1976	0.14	7.69	0.58	1.75	56.9
1977	0.15	7.14	0.58	0.00	60.6
1978	0.15	0.00	0.54	-6.90	65.2
1979	0.15	0.00	0.48	-11.11	72.6
1980	0.15	0.00	0.43	-10.42	82.4
1981	0.19	26.67	0.49	13.95	90.9
1982	0.20	5.26	0.49	0.00	96.5
1983	0.20	0.00	0.47	-4.08	99.6
1984	0.20	0.00	0.45	-4.26	103.9
1985	0.22	10.00	0.48	6.67	107.6
1986	0.22	0.00	0.47	-2.08	109.7
1987	0.22	0.00	0.45	-4.26	113.6
1988	0.25	13.64	0.49	8.89	118.3
1989	0.25	0.00	0.47	-4.08	123.9
1990	0.25	0.00	0.45	-4.26	130.7
1991	0.29	16.00	0.50	11.11	136.2
1992	0.29	0.00	0.48	-4.00	140.3
1993	0.29	0.00	0.47	-2.08	144.5
1994	0.29	0.00	0.46	-2.13	148.2
1995	0.32	10.34	0.49	6.52	152.4
1996	0.32	0.00	0.48	-2.04	156.9
1997	0.32	0.00	0.47	-2.08	160.5
1998	0.32	0.00	0.46	-2.13	163.0
1999	0.33	3.13	0.46	0.00	166.6
2000	0.33	0.00	0.45	-2.17	172.2
2001	0.34	3.03	0.45	0.00	177.0
2002	0.37	8.82	0.48	6.67	179.9
2003	0.37	0.00	0.47	-2.08	184.0
2004	0.37	0.00	0.46	-2.13	188.9
2005	0.37	0.00	0.44	-4.35	195.3
2006	0.39	5.41	0.45	2.27	201.6
2007	0.41	5.13	0.46	2.22	207.3
2008	0.42	2.44	0.46	0.00	215.3
2009	0.44	4.76	0.48	4.35	214.6
2010	0.44	0.00	0.47	-2.08	218.1
2011	0.44	0.00	0.46	-2.13	224.9
2012	0.45	2.27	0.46	0.00	229.6
2013	0.46	2.22	0.46	0.00	*211.32*
2014	0.49	6.52	*0.48*	*5.30*	*214.77*
2015	*0.48*	*-2.33*	*0.49*	*0.29*	*218.21*
2016	*0.49*	*1.84*	*0.49*	*0.29*	*221.65*
2017	*0.50*	*1.81*	*0.49*	*0.29*	*225.09*
2018	*0.51*	*1.78*	*0.49*	*0.28*	*228.53*
2019	*0.51*	*1.75*	*0.49*	*0.28*	*231.97*
2020	*0.52*	*1.72*	*0.49*	*0.28*	*235.41*
2021	*0.53*	*1.69*	*0.49*	*0.28*	*238.85*
2022	*0.54*	*1.66*	*0.50*	*0.28*	*242.29*
2023	*0.55*	*1.63*	*0.50*	*0.28*	*245.74*

Sources:

Bell, Brian. Elections Data Manager, Wisconsin Government Accountability Board. Personal Communication. 15 October 2013.

Consultation with analysts from La Follette School of Public Affairs reviewing GAB use of electronic voter registration.

"CPI Inflation Calculator." U.S. Department of Labor: Bureau of Labor Statistics. <http://data.bls.gov/cgi-bin/cpicalc.pl> Retrieved 27 November 2013.

Appendix 5.2: Postcard Printing Costs

Table 5.2-1: Postcard Printing Costs, GAB Voter List Maintenance			
Year	Number of Postcards	Printing Costs	Cost per Postcard
2008	313205	$8,692.02	$0.03
2010	240226	$10,779	$0.05

Source:

Bell, Brian. Election Data Manager, Wisconsin Government Accountability Board. Personal Communication. 11 September 2013.

Appendix 6.1: Number of Registered Voters in Wisconsin

Table 6.1-1: Number of Registered Voters in Wisconsin, 2008-2013	
Date of GAB record	Registered Voters
10/31/2008	3,502,196
4/3/2009	3,765,074
8/2/2010	3,419,127
12/28/2010	3,493,927
7/13/2011	3,286,011
2/8/2012	3,288,126
8/9/2012	3,453,902
9/28/2012	3,461,683
10/8/2012	3,467,021
10/19/2012	3,487,150
11/2/2012	3,515,230
12/3/2012	3,644,205
1/4/2013	3,695,584
2/1/2013	3,697,016
3/1/2013	3,690,529
4/1/2013	3,682,175
5/1/2013	3,633,419
6/3/2013	3,402,349
7/1/2013	3,401,125
8/2/2013	3,399,169
9/18/2013	3,395,140
11/5/2013	3,392,928

Mean	3,507,868
Maximum (4/3/2009)	3,765,074
Minimum (7/13/2011)	3,392,928

VLM typically takes the GAB approximately six months to complete from postcard mailing to voter inactivation. Therefore, to determine the number of postcards the GAB would have to send under the mass mailings alternative, we first determined the total number of voters registered at the time at which the GAB would send the postcards. To do so, we calculated the average number of registered voters approximately six months before the GAB inactivated voters in each VLM cycle. See Table 6.1-2.

Table 6.1-2: Voter Registration Count, Mass Mailing Alternative 6 Months Prior to Voter Inactivation	
10/31/2008	3,502,196
12/28/2010	3,493,927
12/3/2012	3,644,205
Mean	3,546,776

Conversely, because the GAB would likely conduct VLM under either the NCOA and NCOA-mass mailings alternatives every six months, the number of registered voters under these alternatives should be similar to the number of voter registrations six months after voter inactivation under current VLM practices. See Table 6.1-3.

Table 6.1-3: Voter Registration Count, NCOA and NCOA-Mass Mailing Alternatives 6 Months After Voter Inactivation*	
2/8/2012	3,288,126
11/5/2013	3,392,928
Mean	3,340,527

*Note – the GAB's website does not contain voter registration numbers six months after it inactivated voters in the 2008 VLM cycle.

Source:

"Voter Registration Statistics." Government Accountability Board. <http://gab.wi.gov/publications/statistics/registration> Retrieved 23 November 2013.

Appendix 6.2: Estimating the Number of Cards Mailed

In this analysis, we examined three policy alternatives in which a main cost variable was the number of postcards mailed to voters identified as inactive or possible movers. Therefore, in order to ensure maximum reliability of the underlying analysis, we made a considerable effort to estimate accurately the number of cards mailed under each of these alternatives. For each alternative, the justification for our estimation is explained below.

Current Policy: Mass Mailings to Inactive Voters

In order to estimate the number of postcards mailed under the status quo policy option, we examined the GAB's three previous VLM efforts, the results of which are outlined in Table 6.2-1.

Table 6.2-1: Percent of Voters Identified As Inactive

Date of List Maintenance	Registered Voters[2]	Postcards Sent	Percent
February 1, 2009[3]	3,502,196	313,205[4]	12.52
April 14, 2011[5]	3,493,927	240,226[6]	6.88
March 25, 2013[7]	3,690,529	299,748[8]	8.12

We believe that, because the 2009 VLM effort was the first statewide VLM ever conducted, this proportion is biased strongly upward. In 2007, the Wisconsin LAB issued a report noting that a significant number of municipal clerks had failed to conduct regular maintenance of their voter registration lists. As a result, it is likely that the GAB's 2009 VLM identified a large number of voters who had left their districts long before, but had only just been identified. The fact that during the 2009 VLM effort, roughly 63 percent of postcards were returned undeliverable[9] compared with roughly 27 percent in 2011 and 35 percent in 2013 further supports this hypothesis. Given the percentages observed in the remaining two years and the possibility that a

[2] See Appendix 6.1.
[3] Government Accountability Board. "Summary Report - Four Year Voter Record Maintenance Policy and Process: Memorializing the 2008 - 2009 Four-Year Voter Record Maintenance." 2009.
[4] See Footnote 3.
[5] Government Accountability Board. Memorandum to Governor Scott Walker, "Subject: Voter Registration Four-Year Record Maintenance." April 28, 2011.
[6] Government Accountability Board. Memorandum to GAB Staff, "Subject: Post 2012 General Election Voter Registration Four-Year Record Maintenance - Government Accountability Board Staff will Coordinate/Manage the Post 2012 Process." November 19, 2012.
[7] Government Accountability Board. Memorandum to Governor Scott Walker, "Subject: Voter Registration Four-Year Record Maintenance." April 12, 2013.
[8] Bell, Brian. Election Data Manager, Wisconsin Government Accountability Board. Personal Communication. 11 September 2013.
[9] See Footnote 3.

slightly wider range may be observed in the future, we therefore decided to represent the range of possible percentages for the current policy option as a random variable uniformly distributed between 6.75 percent and 8.25 percent.

NCOA Identification of Voters

To estimate the expected percentage of voters who will have registered with the NCOA in a given year, we relied on the recorded experiences of Minnesota and Ohio where the process of generating a list of voters who has moved was well-understood. The results of these experiences are presented in Table 6.2-2.

Table 6.2-2: Percent of Voters Registered with the NCOA

State - Date of NCOA	Registered Voters	Voters Identified	Percent
Minnesota - 2012[10]	3,387,783	115,129	3.40
Ohio - 2012[11]	6,031,860	296,327	4.91

In the case of Minnesota, the Office of the Secretary of State checks the voter registration list against the NCOA database on a monthly basis, ensuring timely removal of any voter who has recently moved. In 2013, the U.S. Election Assistance Commission reported that Minnesota had identified over 115,000 out of roughly 3.4 million registered voters (approximately 3.40 percent) as having moved during the previous year.

In the case of Ohio, a research study by Jones and Lassen checked the publically available Ohio voter registration list against the NCOA to generate a list of registered voters who had moved between January 1 and December 31, 2012. This effort revealed that roughly 4.91 percent of registered voters had moved that year. This range of values prompted our group to estimate the percent of registered voters who will be identified by the NCOA as a random number uniformly distributed between 3 percent and 5 percent.

Hybrid Alternative: NCOA and Mass Mailings

Because this policy alternative involves two types of mailings, our estimate of the number of postcards sent is a combination of the estimates for the NCOA mailing and the mass mailing. For the NCOA related mailings, we determined that the number of postcards mailed should be the same as the number mailed under the NCOA only option and so we used the same random number uniformly distributed between 3 percent and 5 percent of registered voters. For the mass mailing we likewise decided that the number of postcards sent would be closely related to the number used under current policy; however, because most postcards that are returned undeliverable would be on the NCOA most of those postcards would be eliminated from the

[10] See Table 1.

[11] Jones M., Brad & Lassen S., David. "Changing Homes or Changing Boundaries: The Participatory Consequences of Disruptions in Context due to Residential Mobility." University of Wisconsin Madison, 2013.

mailing altogether. As a result, to estimate the number of postcards sent under this policy option we decided to multiply the number that would be sent under current policy by a normally distributed random variable with a mean of 60 percent and a standard deviation of 0.025.

Appendix 7: Online Survey of Wisconsin Municipal Clerks

To help us monetize the staff cost associated with processing voter list maintenance postcards, we surveyed municipal clerks across Wisconsin. Out of the 1,851 municipalities in the state, 635 municipalities responded (34.2 percent response rate). Merging the survey data with municipal population size indicated that there was little correlation between population size and the probability of responding. Thus, we do not suspect selection issues with respect to municipal size. However, we cannot rule out other selection issues with respect to technology. In previous meetings, the GAB mentioned that about 50 municipalities did not have access to computers and that some clerks worked from home. We were not given a list of these jurisdictions and therefore are unable to control for this in our analysis.

Table 7.1-1: Survey Questions for Wisconsin Municipal Clerks	
Clerk Name	Enter Clerk Name: Open-Ended Response
County	County (if municipality is in multiple counties, use the "MAIN" jurisdiction):
Municipal	Municipality: Open-Ended Response
Q1a	Approximately how long does it take you to process each undeliverable postcard you receive?
Q1b	Approximately how long does it take you to process each undeliverable postcard you receive? Other (please specify)
Q2a	About how long does it take you to process each continuation postcard you receive?
Q2b	About how long does it take you to process each continuation postcard you receive? Other (please specify)

Summary statistics for the two questions are presented in the table below. On average, municipal clerks indicated that processing an undeliverable postcard takes 25 seconds longer than processing a postcard requesting continuation. The large standard deviation and range on the former variable suggest that undeliverable postcards can require a substantial amount of time as staff take additional steps to determine why the postcards were marked undeliverable and justify inactivating voter registrations.

Table 7.1-2						
Variable	Mean	Standard Deviation	Median	Min	Max	N
Q1: Minutes it takes to Process Undeliverable Postcard	3.39	3.00	3	0	60	635
Q2: Minutes it takes to Process Continuation Postcard	2.98	1.61	3	0	15	629

Figure 7.1-1: Histogram of the number of minutes it takes to process one undeliverable postcard.

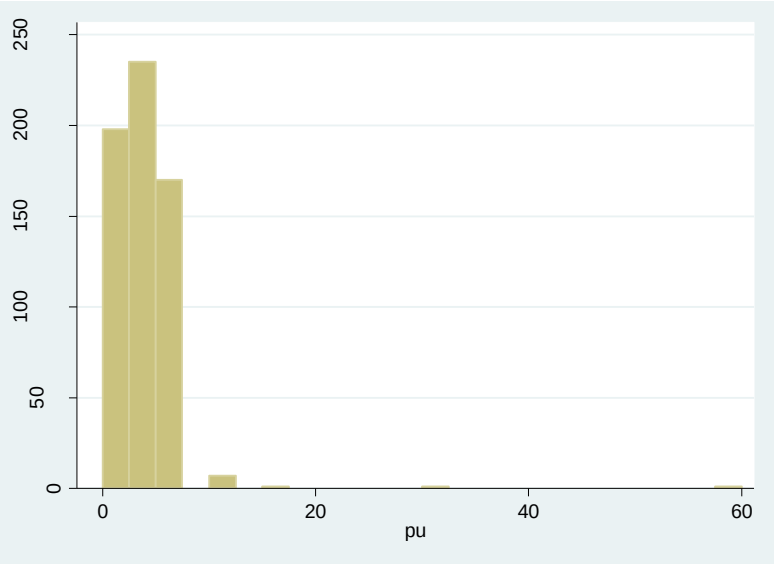
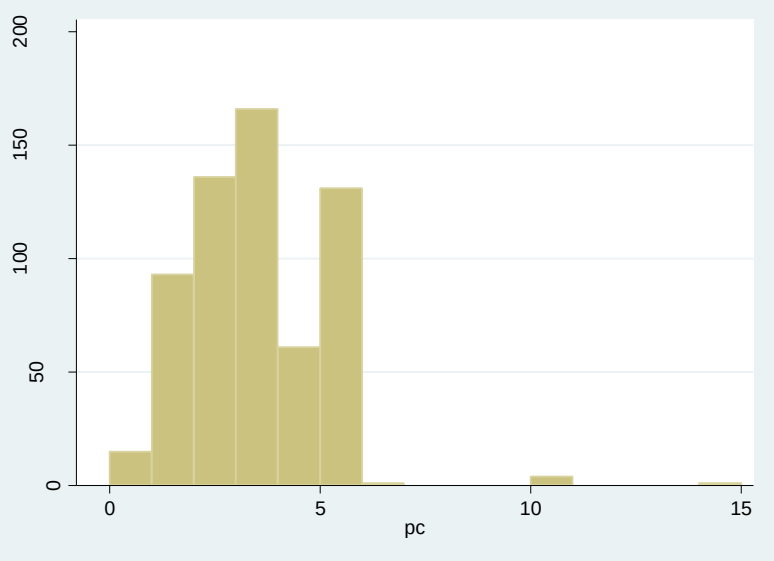


Figure 7.1-2: Histogram of the number of minutes it takes to process one postcard requesting continuation of voter registration.



Source:

GAB Survey of Municipal Clerks in Wisconsin, Administered Online from October 25, 2013 to November 1, 2013.

Appendix 8.1: Rate of Type I Error Accumulation

Although all three of the policy alternatives accumulate Type I errors, they do so at very different rates.

The Accumulation of Errors without the NCOA Database

Current policy generates an error whenever a registered voter moves and does not notify the municipal clerk. This error continues until that individual fails to vote for two consecutive general elections, after which he or she will be identified as an inactive voter. For example, if a registrant had voted in November 2008 and moved in January 2009, he or she would not be inactivated until after the November 2012 Election. All moves unreported to local clerks will accumulate as Type I errors until subsequent VLM efforts identify the voters as inactive. This long period of time between the error creation and error correction is associated with higher costs due to longer poll books.

To approximate the number of Type I errors accumulated each year, we estimated the percentage of registered voters who move without notifying their municipal clerks. To do this, we multiplied the number of registered voters by the expected percentage of voters who will register for the NCOA in a given year. We estimated that roughly 60 to 67 percent of all movers will not register with NCOA (see Appendix 4.2). We then divided this number by approximately 63.5 percent to arrive at an estimate of the number of Type I errors accumulated each year.

The Accumulation of Errors Using the NCOA Database

Under the policy alternative that relies exclusively on the NCOA database, every six months the voter list is screened for individuals who have relocated. As a result, depending on the month in which the GAB elects to conduct VLM, it is possible for the system to catch nearly all relocated voters before the costs are accumulated on Election Day, so long as those movers have registered with the NCOA. Given that roughly 15 percent of moves are not reported to the NCOA, we divided the number of voters expected to register for the NCOA by 0.85 and then subtracted the expected number who would be inactivated by the NCOA-based mailing.

Under the NCOA-only option, this process would remove errors more quickly than under current policy. However, without any additional mechanisms these errors will accumulate indefinitely. Under the policy option that includes both the NCOA and mass mailings, the mass mailings would catch the errors after a period of four to six years, employing the same mechanisms used under current policy.

Sensitivity Analysis of Quickly Eliminating Type I Errors

Because the Statute requires inactivity for at least four years before a record can be inactivated, a voter who moves during the first year of our analysis will not be inactivated until at least year five. In order to assess the robustness of our analysis to different accounting methods for errors under policy alternatives that do not rely on the NCOA database, we conducted a sensitivity analysis assuming that the number of Type I errors is reduced to a baseline level every two years.

The results of this analysis are shown in the two following tables. Using this method to account for errors decreased net present costs by only $136,000, which is not large enough to affect the overall results of our analysis.

Table 8.1-1: Net Present Costs of Current Policy under Standard Handling of Type I Errors

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Printing	$9,770	-	$9,770	-	$9,770	-	$9,770	-	$9,770	-
Mailing	$71,059	-	$71,059	-	$71,059	-	$71,059	-	$71,059	-
Processing	$108,018	-	$108,018	-	$108,018	-	$108,018	-	$108,018	-
Type I Error	$10,387	$20,774	$31,161	$41,548	$31,161	$41,548	$31,161	$41,548	$31,161	$41,548
Type II Error	$72,653	-	$72,653	-	$72,653	-	$72,653	-	$72,653	-
Total	$271,887	$20,774	$292,661	$41,548	$292,661	$41,548	$292,661	$41,548	$292,661	$41,548
Discounted	$267,250	$19,729	$268,543	$36,835	$250,688	$34,386	$234,020	$32,099	$218,460	$29,965
Net Present Costs										$1,392,000

Table 8.1-2: Net Present Costs of Current Policy under Quick Liquidation of Type I Errors

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Printing	$9,770	-	$9,770	-	$9,770	-	$9,770	-	$9,770	-
Mailing	$71,059	-	$71,059	-	$71,059	-	$71,059	-	$71,059	-
Processing	$108,018	-	$108,018	-	$108,018	-	$108,018	-	$108,018	-
Type I Error	$10,387	$20,774	$10,387	$20,774	$10,387	$20,774	$10,387	$20,774	$10,387	$20,774
Type II Error	$72,653	-	$72,653	-	$72,653	-	$72,653	-	$72,653	-
Total	$271,887	$20,774	$271,887	$20,774	$271,887	$20,774	$271,887	$20,774	$271,887	$20,774
Discounted	$267,250	$19,729	$249,481	$18,417	$232,893	$17,193	$217,408	$16,050	$202,953	$14,983
Net Present Value										$1,256,000

Appendix 8.2: Type I Error Marginal Costs

The cost of type I errors is defined as the cost of leaving individuals on the roll who are not eligible to vote. To obtain the type I error marginal cost, we multiplied the average unit cost of printing a poll book sheet, $.15467 (see Appendix 3.4.1), by the average number of elections in a year, 3, multiplied by the number of poll books per polling place, divided by 20 names per double-sided poll book sheet to arrive at a type I error marginal cost of approximately $.05. The average number of elections in a year was calculated by counting the number of elections in even-numbered years (four) and in odd-numbered years (two).

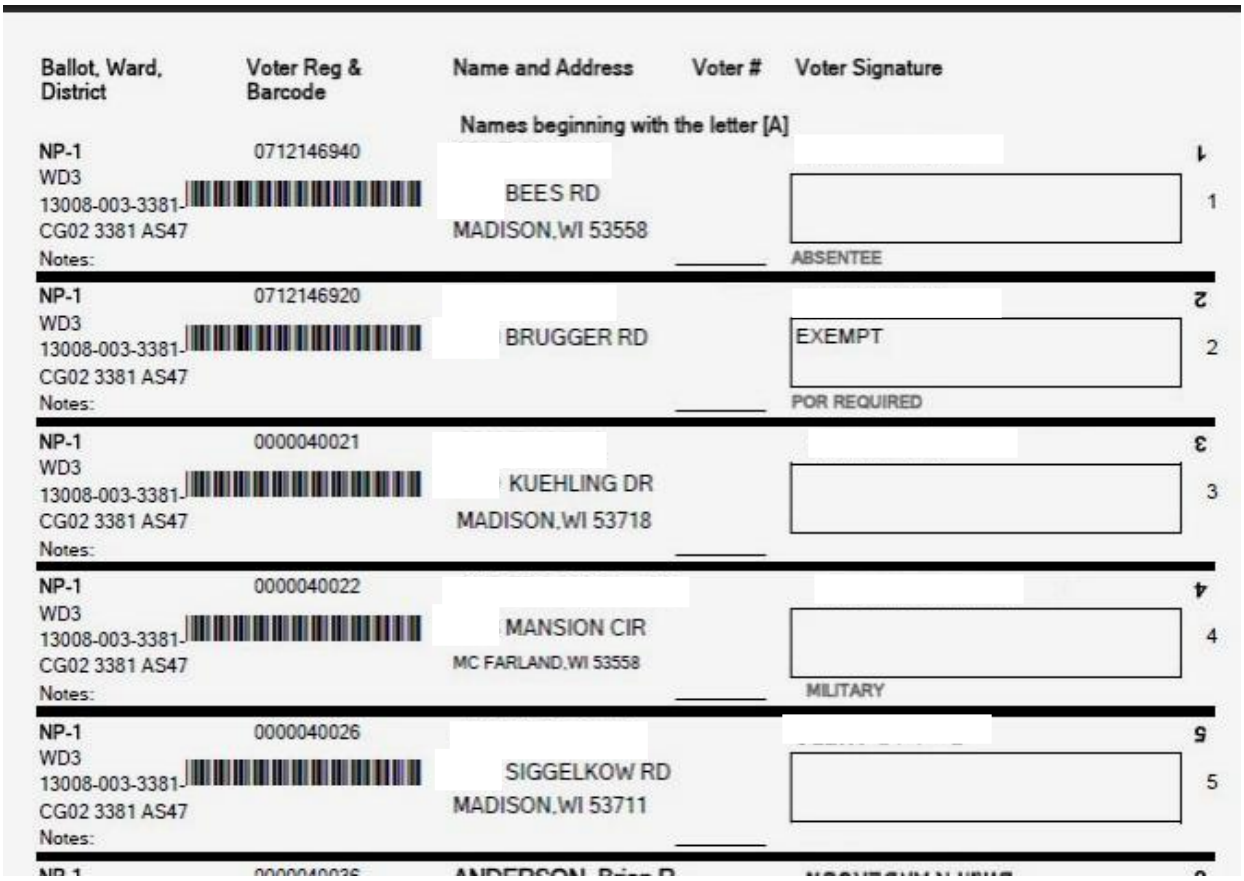
Table 8.2-1: Type I Error Costs	
Number of names per poll book sheet	20
Average unit cost of printing poll book sheet	$.15467
Number of poll books per polling place	2
Average Number of elections in a year	3
Type I Error Marginal Cost	$.05

Appendix 8.3: Sample Poll Book page

Below is a sample from a poll book page for the State of Wisconsin. This is a standardized format. In an actual poll book, there are 10 names per page and sheets are printed double-sided, for a total of 20 names per sheet of paper.

Data included on the page includes voter name, address and a voter signature box for official record-keeping purposes. We have redacted the names of the voters on this sample page.

Figure 8.3-1



Ballot, Ward, District	Voter Reg & Barcode	Name and Address	Voter #	Voter Signature	
		Names beginning with the letter [A]			
NP-1 WD3 13008-003-3381- CG02 3381 AS47 Notes:	0712146940	BEES RD MADISON,WI 53558		ABSENTEE	1
NP-1 WD3 13008-003-3381- CG02 3381 AS47 Notes:	0712146920	BRUGGER RD		EXEMPT POR REQUIRED	2
NP-1 WD3 13008-003-3381- CG02 3381 AS47 Notes:	0000040021	KUEHLING DR MADISON,WI 53718			3
NP-1 WD3 13008-003-3381- CG02 3381 AS47 Notes:	0000040022	MANSION CIR MC FARLAND,WI 53558		MILITARY	4
NP-1 WD3 13008-003-3381- CG02 3381 AS47 Notes:	0000040026	SIGGELKOW RD MADISON,WI 53711			5

Appendix 9: Marginal and Total Costs of Type II Errors

In our analysis, we defined a Type II error as inactivating a voter who had not moved in the prior four years but who had not voted in that time.

Table 1 illustrates the amount of time it would take for a voter who goes to the polling place to vote, but who cannot do so because he has been inactivated, to re-register to vote. The GAB has informed us that it takes, on average, five minutes to register to vote at a polling location. These time costs are outlined further in Appendices 9.1 to 9.2.

Table 9.1-1: Time to Re-Register at Polls			
Average Travel Time (round-trip)	Estimated Time to Retrieve Documents	Estimated Time to Re-Register at Polls	Total time to re-register
.1737 hours	.0833 hours	.0833 hours	.341 hours

We monetized these time costs at half of the median wage plus benefits in Wisconsin, as outlined in Appendix 9.4.

Table 9.1-2: Cost of Re-Registering at Polls			
Total time costs	Median Hourly Wage + Benefits	Value of Commuting Time	Total time costs
0.341 hours	$26.45	.5	$4.51

We then multiplied the average distance from the polls (see Appendix 9.2) by the IRS' current business mileage rate (see Appendix 9.3.)

Table 9.1-3: Costs of Operating a Vehicle		
Average Distance from Polling Location (round-trip)	Cost of operating a vehicle from/to polling location	Total cost of operating a vehicle
3.97 miles	$0.565	$2.24

According to the GAB, it takes 5 minutes for a municipal clerk to process a new registration, so we multiplied that number by the average wage of municipal clerks. See Appendix 9.5.

Table 9.1-4: Municipal Clerk Costs: Processing Additional Registrations		
Clerk Time	Average Clerk Wage	Total clerk time
.0833 hours	$19.32	$1.61

Finally, we added the time costs, vehicle operation costs, and clerk costs to obtain the marginal cost of Type II errors. To account for uncertainty, we ultimately varied these estimates in our sensitivity analysis.

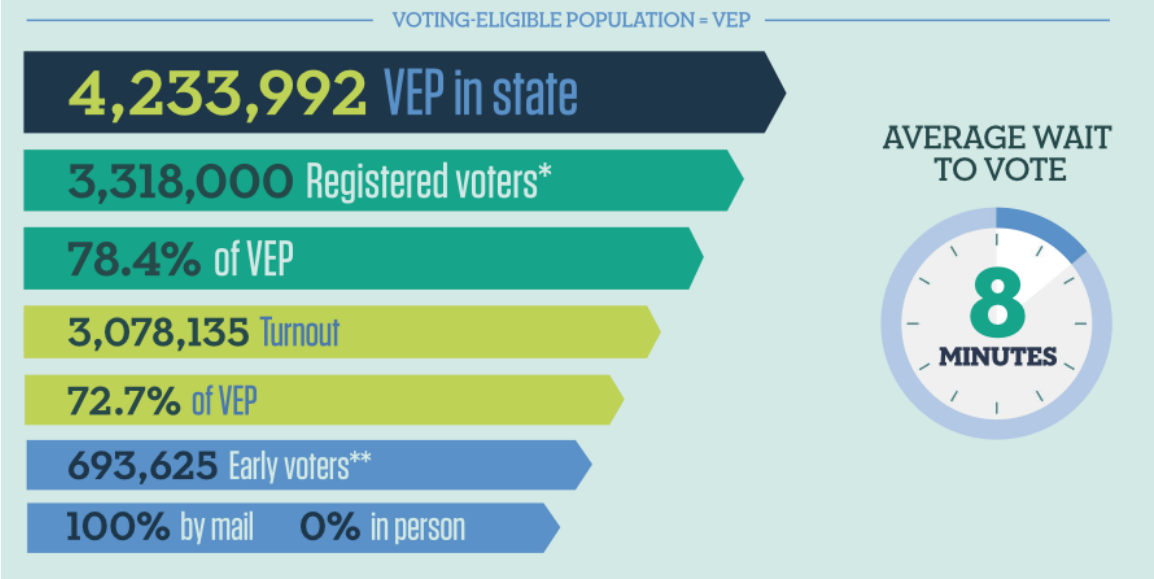
Table 9.1-5: Marginal Cost of Type II Errors			
Time Costs	Vehicle Operation Costs	Total Clerk Costs	Marginal Cost
$4.51	$2.24	$1.61	$8.36

We quantified the number of Type II errors by assuming that for every two continuation requests returned, one voter would fail to return a continuation. The total cost of Type II errors depend on the alternative, ranging from $59,000 for the NCOA-only option to $313,000 for the mass mailing option, and can be found in Table 3 of the main body of this report.

Appendix 9.1: Time to Vote, Register, and Collect Registration Documents

A research project by the Pew Charitable Trusts' State and Consumer Initiatives branch found that the average wait time to vote in Wisconsin in eight minutes, one of the lowest in the nation.

Figure 9.1-1



Source: Pew Charitable Trusts, Election Snapshots – Wisconsin, 2012

Guidance on the time it takes to register came directly from consultation with GAB staff and leadership, who found that, on average, it takes approximately five minutes for an individual to fill out the registration form.

If a voter is mistakenly inactivated from the voter rolls under mass mailing VLM, then he or she must re-register at her polling place. Therefore, this individual likely will need to return home to retrieve documentation, and then return to the polls to re-register.

Appendix 9.2: Calculation of Time and Distance during Re-Registration

We asked the GAB for a random sample of one thousand addresses currently in the Statewide Voter Registration System (SVRS). From this list, we randomly selected 102 addresses. Addresses were entered in the myvote.wi.gov interface to find the voting jurisdiction, ward number, and polling place address corresponding to each residential address. We then entered the polling and residential addresses into maps.google.com to obtain the distance in miles between the two locations, the driving distance in minutes, and the walking distance in minutes. We desired to include travel time by bus but that information was not available for all addresses. The image below is a snapshot of what our data look like, with the residential addresses partially hidden for privacy reasons.

Figure 9.2-1

street	city	ZIP	ward	municipality	polling place	oneway miles	drive mins	walk mins
1010 M	GREEN BAY	54303-9441	39	City of Green Bay	BETHEL EVANGELICAL LUTHERAN CHURCH, 1350 BOND ST, GREEN BAY	1.0	4	19
1016 E	APPLETON	54915-2631	44	city of appleton	HOPE LUTHERAN BRETHREN CHURCH, 415 E HOOVER AVE, APPLETON 54915-2012	0.9	3	17
111 SU	LODI	53555-1434	6	City of Lodi	LODI CITY HALL, 130 S MAIN ST, LODI, 53555-1119	0.6	3	10
1113 W	ARKDALE	54613-9800	2	town of big flats	TOWN OF BIG FLATS, 1104 COUNTY ROAD C, ARKDALE 546139728	4.1	8	80
1137 B	NEKOOSA	54457-9257	1	Big Flats	1104 County Road C, Arkdale 54613-9728	2.6	5	50
12 STA	DEERFIELD	53531-9531	3	village of deerfield	FIRE STATION 2012, 305 N INDUSTRIAL PARK RD, DEERFIELD	0.7	3	14
1211 B	GREEN BAY	54313-7261	10	Village of Howard	2012 BAYVIEW MIDDLE SCHOOL, 1217 CARDINAL LN, GREEN BAY, 54313-7110	0.6	2	11
1212 1	GREEN BAY	54304-2534	29	City of Green Bay	TRINITY LUTHERAN CHURCH, 330 S BROADWAY, GREEN BAY, 54303-1518	1.7	6	30
1212 C	WAUNAKEE	53597	5	Waunakee	333 S MADISON ST, WAUNAKEE, 53597-1600	1.8	6	29
1215 S	GREEN BAY	54304-2331	33	City of Green Bay	CALVARY LUTHERAN CHURCH, 1301 S RIDGE ROAD, GREEN BAY	0.3	2	6

Across the 102 observations, the average one-way distance is 1.99 miles or 5.22 minutes by car or 37.67 minutes by walking. We concluded that most voters would be driving to polling places and that the average round-trip distance is 3.97 miles or 10.43 minutes driving time. Additional summary statistics are presented below.

Table 9.2-1

Variable Name	Mean	Standard Deviation	Median	Min	Max	N
Miles from Polling Place (One-way)	1.99	2.09	1.1	0.067	13.3	102
Miles from Polling Place (Round Trip)	3.97	4.18	2.2	0.134	26.6	102
Minutes from Polling Place (Driving, One-way)	5.22	5.14	4	0.5	43	102
Minutes from Polling Place (Driving, Round Trip)	10.43	10.28	8	1	86	102
Minutes from Polling Place (Walking, One-way)	37.67	38.67	22	1	226	102

Figure 9.2-2: Histogram of driving minutes from residence to polling place, round trip.

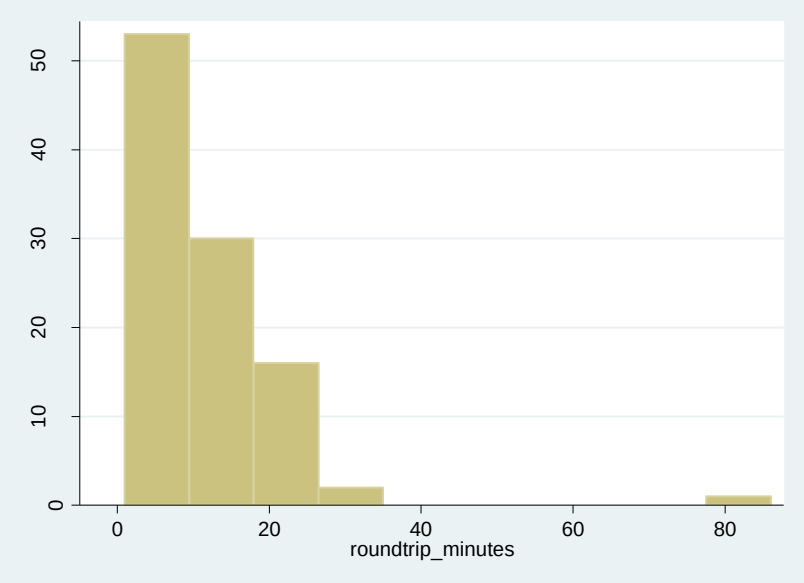
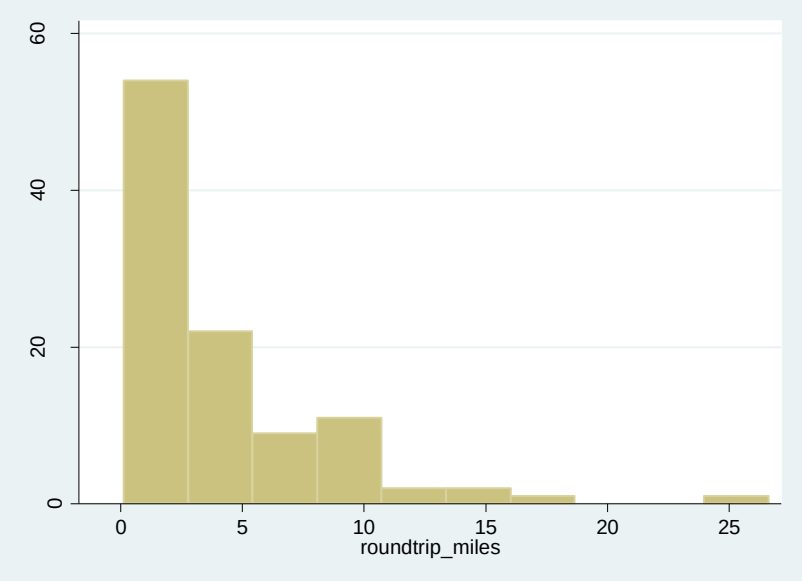


Figure 9.2-3: Histogram of distance in miles from residence to polling place, round trip.



Sources:

List of One Thousand Randomly Selected Residential Addresses of Registered Voters in Wisconsin, Provided by the GAB on November 13, 2013.

My Vote Wisconsin for Regular Voters. Accessed myvote.wi.gov on November 15, 2013.

Google Maps Directions by Car and Walking. Accessed on google.maps.com November 15, 2013.

Appendix 9.3: Standard Mileage Rate

The following is a list of Standard Mileage Rates (in cents) used by the Internal Revenue Service since 1997. According to the IRS, "[t]he standard mileage rate for business is based on an annual study of the fixed and variable costs of operating an automobile" ("Standard Mileage Rates for 2013"). We have used the current business rate to determine an individual's cost of operating a vehicle to and from her polling place. To avoid arbitrarily setting maximum and minimum bounds, we accepted the IRS's rate for 2013 as our Standard Mileage Rate.

Table 9.3-1

Year	Business Rate (cents per mile)	Year	Business Rate (cents per mile)
2013	56.5	Jan.-Aug. 2005	40.5
2012	55.5	2004	37.5
July-Dec. 2011	55.5	2003	36
Jan.-June 2011	51	2002	36.5
2010	50	2001	34.5
2009	55	2000	32.5
July-Dec. 2008	58.5	Apr.-Dec. 1999	31
Jan.-June 2008	50.5	Jan.-Mar. 1999	32.5
2007	48.5	1998	32.5
2006	44.5	1997	31.5
Sept.-Dec. 2005	48.5		

Sources:

"Standard Mileage Rates." Internal Revenue Service. September 2013. <http://www.irs.gov/Tax-Professionals/Standard-Mileage-Rates> Retrieved 23 November 2013.

"Standard Mileage Rates for 2013." Internal Revenue Service. November 2013. <http://www.irs.gov/uac/Newsroom/2013-Standard-Mileage-Rates-Up-1-Cent-per-Mile-for-Business,-Medical-and-Moving> Retrieved 23 November 2013.

Appendix 9.4: Leisure Wage of Wisconsin Voters

We used a calculation of the average hourly earnings in part to value the cost of incorrectly removing an individual from the voter rolls. An incorrect removal will result in an individual, believing himself or herself to be eligible to vote, to have to travel home to retrieve the requisite documents necessary to register at the polling location. To find this hourly earnings figure, we retrieved the Wisconsin-specific data from the Bureau of Labor Statistics regarding median wages:

Table 9.4-1			
Occupation Type	Employment	Median Hourly Wage	Mean Hourly Wage
All Employment	2,673,280	$16.18	$20.15

This median wage rate includes base rate, commission, incentive pay, cost-of-living allowances, hazard pay, tips, and other factors related to direct wages. This wage rate excludes important factors in determining one's real earnings such as holiday bonuses, year-end bonuses, health care coverage, retirement plans, and more. In order to form a more accurate measure of a person's real hourly earnings, we calculated the average amount of benefits a Wisconsin worker receives through the Salary.com Benefits Wizard Tool, a source relied upon by the *New York Times*, *Forbes* magazine, and other sources for benefits information.

Median Hourly Earnings = Median Hourly Wage + Median Hourly Benefits

Using the calculated median hourly wage of $16.18, we input an annual wage of $33,654.40 ($16.18 * 40 hours * 52 weeks = $33,654.40)

Table 9.4-2	
Base Salary:	$33,654
Social Security:	$5,150
401k/403b:	$1,279
Disability:	$236
Healthcare:	$6,507
Pension:	$2,154
Time Off (32 Days):	6028
Total Annual Salary+Benefits:	$55,008
Hourly Wage+Benefits:	$26.45
Leisure Wage:	$13.22

We arrived at an hourly wage including benefits of $26.45 per hour. We value the time a voter spends retrieving his documentation and returning to the polls similarly to auto commuting time at 50 percent of a voter's after-tax wage rate. We have included this 50 percent range in our sensitivity analysis for the cost of Type II errors. Using this 50 percent figure, we arrive at a leisure wage of $13.22.

Sources:

Boardman, Anthony E. David H. Greenberg, Aidan R. Vining, and David L. Weimer, *Cost-Benefit Analysis: Concepts and Practice, 4th Ed.* (New York: Pearson Education, Inc., 2011).

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Employment Statistics (May, 2012).*

Salary.com, "Salary.com Benefit Wizard." Accessed November 9, 2013. <http://swz.salary.com/MyBenefits/LayoutScripts/Mbfl_Start.aspx.>

Appendix 9.5: Mean Hourly Clerk Wage

Our survey of municipal clerks included questions about pay for both full- and part-time clerks. Using the numbers provided by clerks, we calculated average hourly clerk wage with a weighted mean method. Using given salary and the number reported, we determined weighted average wage for large, medium and small municipalities at both full-time and part-time pay. Using the two average yearly wages, we then used the same method to determine an overall weighted hourly wage of $19.32. See Table 9.5-1 for calculations.

Table 9.5-1

FULL TIME	Average annual Salary (Estimated or Actual) 2013	Plus Benefits	Number Reporting	Percent of municipalities	Weighted Average Wage	
Large Municipality	35,600.73	48,060.99	58.00	37.91	$18,219.20	
Medium Municipality	68,376.52	92,308.30	10.00	6.54	$6,033.22	
Small Municipality	54,412.76	73,457.22	85.00	55.56	$40,809.57	
Grand Total	48,194.06	65,061.99	153.00	1.00	65,061.99	Annual Wage
PART TIME						
Large Municipality	10,897.85		391	95.37	$10,392.83	
Medium Municipality	NA		0	0.00	NA	
Small Municipality	8,854.13		19	4.63	$410.31	
Grand Total	10,803.14		410.00	1.00	10,803.14	Annual Wage
	Number of Respondents	Percent	Number of Hours	Annual Average	Annual Salary	Hourly Wage
Full-Time	153	27.18	2080	65061.99	17681.14	31.28
Part-Time	410	72.82	1040	10803.14	7867.30	10.39
Grand Total	563				25548.44	Weighted Annual Salary
					19.32	Weighted Hourly Wage

Appendix 10: The General Net Present Value Equation

The following two equations represent our calculation of the net present value of current policy and each alternative.

$$NPV = startup + \sum_{t=1}^{10} \frac{Net\ Costs_t}{(1+0.035)^{t-0.5}}$$

where:

$$Net\ Costs_t = NCOA_t + printing_t + mailing_t + staff_t + type1error_t + type2error_t$$

For this equation, $startup$ is the cost of establishing one of the policy alternatives. For current policy this value is zero. The variable $NCOA_t$ represents the annual cost of accessing the NCOA database. For current policy this value is also zero. The variable $printing_t$ represents the cost of printing the postcards that the GAB sends to identified registrants to verify that they relocated. The variable $mailing_t$ represents the cost of mailing the postcards to the registrant's address on record or new address. The time cost incurred by municipal clerks to process returned postcards is depicted by $staff_t$. Component $type1error_t$ is the cost of failing to inactivate a registrant who has moved out of the voting jurisdiction. Component $type2error_t$ is the cost of inadvertently inactivating a voter who has not moved. The sections below provide a brief description of each cost component.

Cost of Accessing the NCOA

To institute either of the two policy alternatives that require access to the NCOA, the GAB will need to contract with a licensed vendor to search the Wisconsin voter rolls for voters who have registered with the USPS database. While it is possible for the Wisconsin Department of Administration to process this request, the costs would likely be prohibitive. Instead the GAB, like the Minnesota Secretary of State's Office, will most likely negotiate a contract with a private vendor. Therefore for the policy alternatives we used the costs to Minnesota as a basis for estimating the costs to the State of Wisconsin. The current policy does not involve the NCOA database or its associated costs; therefore the cost is zero.

Cost of Printing Notification Postcards

As shown in the equation below, we calculate the expected cost of printing by multiplying the GAB's historical per unit cost of printing notification postcards by the expected number of postcards the GAB will print under each policy option.

$$printing_t = npostcards_t * perunitcost$$

Because the per unit cost for VLM was relatively consistent after the 2010 and 2012 general elections, we set this cost as a point estimate. To determine the expected number of postcards required for each policy, we multiplied the expected number of registered voters in Wisconsin by the corresponding percentages of postcards mailed.

Cost of Mailing Postcards

To calculate the expected costs of mailing, we multiplied the expected total number of cards by the expected percentage of postcards sent at the international rate, full rate, or bulk rate. While we assumed that the overall postage rates would not significantly change relative to inflation, we allowed the overall percentage of each type of mail to vary slightly in our sensitivity analysis to better control for expected fluctuations over the life of the project. The basic mailing cost equation is shown below.

$$mailing_t = npostcards_t * perunitcost$$

For more information about postcard mailing, see Appendix 5.1.

Cost of Processing Returned Postcards

Under all policy alternatives, municipal clerks must process all postcards returned requesting continuation or returned as undeliverable at the given address. While this cost is not levied directly on the GAB it can be substantial given the scale of the Wisconsin VLM effort. To calculate the marginal cost of processing continuation and undeliverable postcards, we multiplied the average hourly wage of Wisconsin municipal clerks with the amount of time each task demands, as reported by clerks in our online survey (See Appendix 7). We then weighed this marginal cost by the expected percentage of postcards returned under each category and then multiplied that by the total number of cards sent. The corresponding equation is presented below.

$$staff_t = npostcards_t * percentcontinue_t * perunitcostcontinue + npostcards_t * percentundeliverable_t * perunitcostundeliverable$$

Because the GAB processes unreturned postcards in a batch update to the SVRS database, processing these cards requires negligible staff time. As a result, we estimated the cost of processing unreturned postcards to be zero dollars.

Type I Errors (Cost of Failing to Inactivate Ineligible Voters)

Because Type I errors occur as soon as voters change residence without notifying municipal clerk, some registrants may not be caught by VLM for a period of time. The associated costs will accrue until the day of elections when VLM will inactivate registrants who moved. For the NCOA policy options, we excluded Type I errors that should be caught by the semi-annual VLM process. We believe that the primary cost of Type I errors is the increased cost of poll books due to longer voting lists. As shown in the equation below, to calculate the marginal cost of an error we multiplied the cost of printing one extra page in a poll book by the number of poll books required in each general election and by the number of general elections held each year. We then multiplied this value by the fraction of each page the ineligible voter will consume.

$$costper1error = ntype1errors * errorsperpage * costperpage * bookspere lection * nelections$$

To find the annual total cost of Type I errors, we multiplied the marginal cost by the expected number of Type I errors for each policy option as shown below.

$$newtype1error_t = nvoters_t * percentmoved_t * costper1error$$

For more information on Type I error, see Appendices 8.1 and 8.2.

Type II Errors (Cost of Incorrectly Inactivating Voters Who Did Not Move)

We believe that the primary cost of incorrectly inactivating a voter from the rolls is the cost of reregistration incurred by the voter and incurred by the municipal clerk. Shown below is the equation that calculates the marginal cost of a Type II error.

$$costper2error = (WIwage * leisurewage) * (timedrive + timesearch + timeregister) + (distance * costpermile) + staffwage * timeprocess$$

We multiplied the median value of wage and benefits in Wisconsin by a leisure reduction factor of 0.5. We then multiplied the resulting leisure wage by the time required to drive home, search for the required documents, drive back to the polls, and to reregister. To calculate the additional cost of fuel and wear on the automobile, we multiplied the average distance between a voter's residence and his or her polling place by the federal mileage reimbursement rate. Finally, to calculate the time cost of municipal clerks to process the registration, we multiplied the clerk's average wage with the expected time required to process the registration as reported in our survey of Wisconsin clerks. To find the expected total cost of Type II errors, we multiplied the marginal cost by the expected number of Type II errors under each policy, as shown in the equation below.

$$type2error_t = npostcards_t * percenterror_t * costper2error$$

For more information on how we monetized Type 2 Errors, see Appendices 9 through 9.5.

Appendix 11: Undiscounted Biannual Costs

Table 11-1: Undiscounted Total Costs for Current Policy
(2015 - 2016 Biennium)

Category	2015	2016	Total
Costs to GAB			
NCOA Contract	-	-	-
Printing Costs	$10,707	-	$10,707
Mailing Costs	$71,059	-	$71,059
Other Costs			
Staff Processing Costs	$99,315	-	$99,315
Type I Errors	$10,387	$20,774	$10,387
Type II Errors	$72,653	-	$72,653
Total Costs	$264,121	$20,744	$284,865

Table 11-2: Undiscounted Total Costs for NCOA Mailings
(2015 - 2016 Biennium)

Category	2015	2016	Total
Costs to GAB			
NCOA Contract	$5,750	$5,750	$11,500
Printing Costs	$5,343	$5,343	$10,686
Mailing Costs	$35,460	$35,460	$70,920
Other Costs			
Staff Processing Costs	$21,062	$21,062	$42,124
Type I Errors	$3,547	$7,094	$10,641
Type II Errors	$6,972	$6,972	$13,944
Total Costs	$78,134	$81,681	$159,815

Table 11-3: Undiscounted Total Costs for NCOA and Mass Mailings
(2015 - 2016 Biennium)

Category	2015	2016	Total
Costs to GAB			
NCOA Contract	$5,750	$5,750	$11,500
Printing Costs	$12,857	$5,343	$18,200
Mailing Costs	$85,326	$35,460	$120,786
Other Costs			
Staff Processing Costs	$49,721	$21,062	$70,783
Type I Errors	$3,547	$7,094	$10,641
Type II Errors	$57,956	$6,972	$64,928
Total Costs	$215,157	$81,681	$296,838

Appendix 12: Discount Rate

We use a discount rate of 3.5 percent. To determine the appropriate discount rate, we relied on Cost-Benefit Analysis literature: "For most projects that do not have impacts beyond 50 years…we recommend a real social discount rate of 3.5 percent" (Boardman et. al., 12). We applied the discount rate in the middle of each year.

Our net present value equations are discounted over a ten-year period, the longest period of time that we felt confident a policy would remain in effect. Additionally, the GAB informed us that it was interested in a ten-year timeframe for this cost-benefit analysis.

Source:

Boardman, Anthony E. David H. Greenberg, Aidan R. Vining, and David L. Weimer, *Cost-Benefit Analysis: Concepts and Practice, 4th Ed.* (New York: Pearson Education, Inc., 2011).

Appendix 13.1: Monte Carlo Sensitivity Analysis

In order to examine the consequences of the uncertainties involved in estimating the costs of our policy alternatives, we elected to conduct Monte Carlo sensitivity analyses on our three primary policy options. For the purposes of these analyses, we defined each variable as either uniformly distributed, normally distributed, or fixed. If our research indicated a likely range of possible values without indicating a specific distribution of values within that range, we selected a uniform distribution. If our research indicated a range of values with a convincing center of mass, we selected a normal distribution. In all other situations, we elected to use point estimates. For each of the policy alternatives simulated, a summary of values used in these analyses is found in Tables 13.1-1, 13.1-2, and 13.1-3. For a more extensive discussion of the details of the net benefits equation please see Appendix 10 - Net Benefits Equation. For discussions of specific variables please see the indicated appendix.

Table 13.1-1: Current Policy Monte Carlo Analysis
List of Parameters Estimated

Parameter	Estimate	Appendix
General Parameters		
Discount Rate	0.035	12
Number of Registered Voters	3,493,927 - 3,644,205	6.1
Percent of Registered Voters Identified as Inactive	0.0675 - 0.0825	6.1
Cost of Printing		
Cost of Printing One Postcard (Dollars)	0.0365	5.2
Cost of Postage		
Postage for Postcards Mailed Internationally (Dollars)	1.10	5.1
Percent of Postcards Mailed Internationally	0.00125 - 0.00135	5.1
Postage for Postcards Mailed at the Full Rate (Dollars)	0.33	5.1
Percent of Postcards Mailed at the Full Rate	0.31 - 0.35	5.1
Postage for Postcards Mailed at the Bulk Rate (Dollars)	0.23199	5.1
Percent of Postcards Mailed at the Bulk Rate	1 - (Full Rate% + Intl Rate%)	5.1
Cost of Staff Time		
Clerk Average Wage (Dollars)	19.32	9.5
Time to Process One Continuation Request (Hours)	Normal Mean 0.0497, Std. Dev. 0.0011	7
Percent of Mailed Postcards Requesting Continuation	0.05 - 0.08	Table 2, VLM in Practice
Time to Process One Undeliverable Postcard (Hours)	Normal Mean 0.0565, Std. Dev. 0.0020	7
Percent of Mailed Postcards Returned Undeliverable	0.250 - 0.375	Table 2, VLM in Practice

Table 13.1-1 (cont'd): Current Policy Monte Carlo Analysis
List of Parameters Estimated

Parameter	Estimate	Appendix
Cost of Type I Errors		
Percent of Voters Registered in NCOA	0.03 - 0.05	8.1
Percent of Movers who Register in NCOA	0.60 - 0.67	8.1
Number of Voters on One Page of Poll Book	20	8.2
Cost of Printing One Page of a Poll Book (Dollars)	0.154	8.2
Number of Poll Books at Each Polling Location	2	8.2
Average Number of Elections per Year	3	8.2
Cost of Type II Errors		
Proportion of Type II Errors to Requests for Continuation	0 - 1	9
Median WI Leisure Wage (Dollars)	13.22	9.5
Round Trip Time to Polling Place (Hours)	Normal Mean 0.1737, Std. Dev. 0.0170	9.2
Time to Search for Documents (Hours)	0.0833	9.1
Time to Reregister (Hours)	0.0833	9.1
Round Trip Distance to Polling Place (Miles)	Normal Mean 3.97, Std. Dev. 0.4139	9.2
Federal Reimbursement Rate for Mileage (Dollars)	0.565	9.3
Clerk Time to Process Reregistration (Hours)	0.0833	9.5

Table 13.1-2: NCOA-Only Monte Carlo Analysis
List of Parameters Estimated

Parameter	Estimate	Appendix
General Parameters		
Discount Rate	0.035	12
Number of Registered Voters	3,286,011 - 3,392,928	6.1
Percent of Voters Registered with NCOA	0.03 - 0.05	6.1
Cost of NCOA Contract		
Startup Costs (Dollars)	14,000	4.2
Cost of Generating List of Movers (Dollars)	Normal Mean 5,750, Std. Dev. 500	4.2
Cost of Printing		
Cost of Printing One Postcard (Dollars)	0.0365	5.2
Cost of Postage		
Postage for Postcards Mailed Internationally (Dollars)	1.10	5.1
Percent of Postcards Mailed Internationally	0.00125 - 0.00135	5.1
Postage for Postcards Mailed at the Full Rate (Dollars)	0.33	5.1
Percent of Postcards Mailed at the Full Rate	0.31 - 0.35	5.1
Postage for Postcards Mailed at the Bulk Rate (Dollars)	0.23199	5.1
Percent of Postcards Mailed at the Bulk Rate	1 - (Full Rate % + Intl Rate %)	5.1
Cost of Staff Time		
Clerk Average Wage (Dollars)	19.32	9.5
Time to Process One Continuation Request (Hours)	Normal Mean 0.0565, Std. Dev. 0.0020	7
Percent of Mailed Postcards Requesting Continuation	0.010 - 0.015	Table 2, VLM in Practice
Time to Process One Undeliverable Postcard (Hours)	Normal Mean 0.0497, Std. Dev. 0.0011	7
Percent of Mailed Postcards Returned Undeliverable	0.179	Table 2, VLM in Practice

Table 13.1-2 (continued)

Parameter	Estimate	Appendix
Cost of Type I Errors		
Percent of Movers who Register in NCOA	0.60 - 0.67	8.1
Number of Voters on One Page of Poll Book	20	8.2
Cost of Printing One Page of a Poll Book (Dollars)	0.154	8.2
Number of Poll Books at Each Polling Location	2	8.2
Average Number of Elections per Year	3	8.2
Cost of Type II Errors		
Proportion of Type II Errors to Requests for Continuation	0 - 1	9
Median WI Leisure Wage (Dollars)	13.22	9.5
Round Trip Time to Polling Place (Hours)	Normal Mean 0.1737, Std. Dev. 0.0170	9.2
Time to Search for Documents (Hours)	0.0833	9.1
Time to Reregister (Hours)	0.0833	9.1
Round Trip Distance to Polling Place (Miles)	Normal Mean 3.97, Std. Dev. 0.4139	9.2
Federal Reimbursement Rate for Mileage (Dollars)	0.565	9.3
Clerk Time to Process Reregistration (Hours)	0.0833	9.5

Table 13.1-3: Hybrid Alternative Monte Carlo Analysis
List of Parameters Estimated

Parameter	Estimate	Appendix
General Parameters		
Discount Rate	.035	12
Number of Registered Voters	3,286,011 - 3,392,928	6.1
Percent of Voters Registered with NCOA	0.03 - 0.05	6.1
Percent of Voters Identified as Inactive	0.0675 - 0.0825	6.1
Percent of Inactive Voters Not Registered with NCOA	0.70 - 0.80	6.1
Cost of NCOA Contract		
Startup Costs (Dollars)	14,000	4.2
Cost of Generating List of Movers (Dollars)	Normal Mean 5,750, Std. Dev. 500	4.2
Cost of Printing		
Cost of Printing One Postcard (Dollars)	0.0365	5.2
Cost of Postage		
Postage for Postcards Mailed Internationally (Dollars)	1.10	5.1
Percent of Postcards Mailed Internationally	0.00125 - 0.00135	5.1
Postage for Postcards Mailed at the Full Rate (Dollars)	0.33	5.1
Percent of Postcards Mailed at the Full Rate	0.31 - 0.35	5.1
Postage for Postcards Mailed at the Bulk Rate (Dollars)	0.23199	5.1
Percent of Postcards Mailed at the Bulk Rate	1 - (Full Rate + Intl Rate)	5.1
Cost of Staff Time		
Clerk Average Wage (Dollars)	19.32	9.5
Time to Process One Continuation Request (Minutes)	Normal Mean 0.0565, Std. Dev. 0.0020	7
Percent of Postcards Requesting Cont. for NCOA Mailings	0.010 - 0.015	5.2
Percent of Postcards Requesting Cont. for Mass Mailings	0.05 - 0.08	5.2
Time to Process One Undeliverable Postcard (Minutes)	Normal Mean 0.0497, Std. Dev. 0.0011	7
Percent of Postcards Undeliverable for NCOA Mailings	0.179	5.2
Percent of Postcards Undeliverable for Mass Mailings	0.063 - 0.107	5.2

Table 13.1-3 (continued)

Parameter	Estimate	Appendix
Cost of Type I Errors		
Percent of Movers who Register in NCOA	0.60 - 0.67	8.1
Number of Voters on One Page of Poll Book	20	8.2
Cost of Printing One Page of a Poll Book (Dollars)	0.154	8.2
Number of Poll Books at Each Polling Location	2	8.2
Average Number of Elections per Year	3	8.2
Cost of Type II Errors		
Proportion of Type II Errors to Requests for Continuation	0 - 1	9
Median WI Leisure Wage (Dollars)	13.22	9.5
Round Trip Time to Polling Place (Hours)	Normal Mean 0.1737, Std. Dev. 0.0170	9.2
Time to Search for Documents (Hours)	0.0833	9.1
Time to Reregister (Hours)	0.0833	9.1
Round Trip Distance to Polling Place (Miles)	Normal Mean 3.97, Std. Dev. 0.4139	9.2
Federal Reimbursement Rate for Mileage (Dollars)	0.565	9.3
Clerk Time to Process Reregistration (Hours)	0.0833	9.5

Appendix 13.2: Calculation of Net Present Benefits

For our analysis, we compounded net benefits over a period of ten years, the longest period of time that we felt confident a policy would remain in effect (see Appendix 12). We then varied the uncertain parameters over their expected ranges over 10,000 separate draws against the net benefit equation. The figures below illustrate the expected ranges for the future costs of current policy and for the expected net benefits of implementing either of the policy alternatives.

Figure 13.2-1: Total Costs for Current Policy

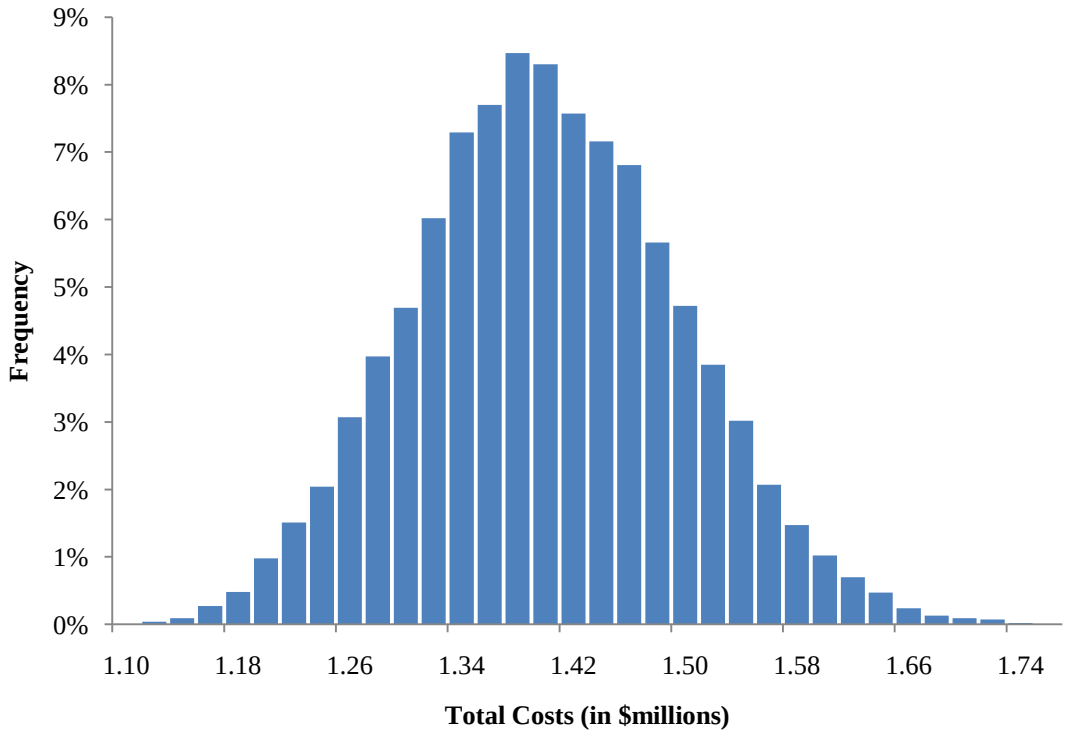


Table 13.2-2: Net Present Value of NCOA Alternative

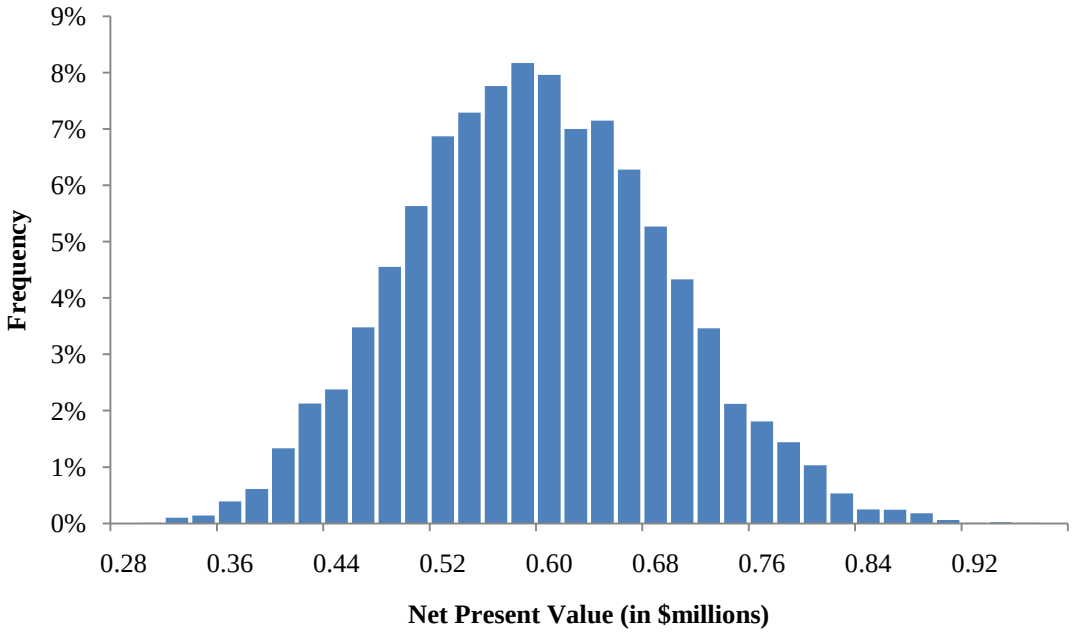
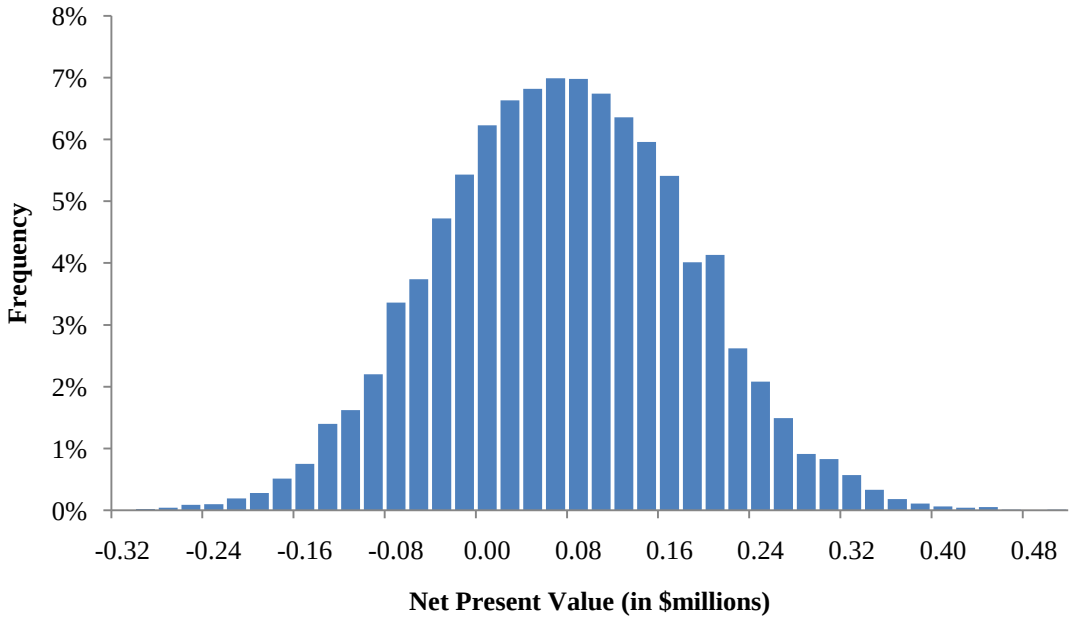


Table 13.2-3: Net Present Value of Hybrid Alternative



Appendix 14: STATA .do Files

```
clear
cls

////////////////////////////////////////////////////////////
//  Monte Carlo Analysis of Voter List Maintenance Costs  //
////////////////////////////////////////////////////////////

*Initial Setup*
set obs 10000
set seed 12180152

////////////////////////////
// Generate Marginal Costs //
////////////////////////////

*Discount Rate*
gen discountrate = 0.035

*NCOA Costs*
gen C_startup = 14000
gen C_ncoa = rnormal(5750, 500)

*Printing*
gen C_printingpercard = 0.0365 //cost of printing one postcard

*Mailing*
gen C_intlrate = 1.10 //cost of mailing one postcard at international rate
gen P_intlrate = 0.00125 + (.0001 * runiform()) //percentage of postcards
mailed at international rate
gen C_fullrate = 0.33 //cost of mailing one postcard at the full rate
gen P_fullrate = 0.31 + (0.04 * runiform()) //percentage of postcards
mailed at full rate
gen C_presort = 0.23199 //cost of mailing one postcard at the GAB bulk rate
```

```
gen P_presort = 1 - (P_intlrate + P_fullrate) //percentage of postcards
mailed at bulk rate

gen C_mailingpercard = (C_intlrate * P_intlrate) + (C_fullrate *
P_fullrate) + (C_presort * P_presort) //average cost of mailing one
postcard


*Municipal Processing Costs*

gen C_staff = 19.32 //hourly wage of a municipal clerk

gen T_continuation = rnormal(0.0497, 0.0011) //avg time in hours required
to process one request for continuation

gen T_undeliverable = rnormal(0.0565, 0.0020) //avg time in hours required
to process one undeliverable postcard

gen C_percont = (C_staff * T_continuation) //cost of processing one request
for continuation

gen C_perundeliv = (C_staff * T_undeliverable) //cost of processing one
undeliverable postcard


*Type 1 Error Parameters*

gen N_errorsperpage = 0.05 //number of entries on one page of a poll book

gen C_pollbookpage = 0.154 //cost of printing one page of a poll book

gen N_pollbooks = 2 //number of poll books at each polling place

gen N_elections = 3 //average number of elections per year

gen C_t1pererror = N_errorsperpage * C_pollbookpage * N_pollbooks *
N_elections


*Type 2 Error Parameters*

gen C_WImedianleisurewage = 13.22 //median wages and benefits in WI * .5

gen T_roundtrip = rnormal(0.1737,0.0170) //average time in hours for round
trip to polling place

gen T_search = 0.0833 //average time in hours to find documents

gen T_reregister = 0.0833 //average time in hours to reregister

gen Dist_drive = rnormal(3.97,0.4139) //average distance in miles for round
trip to polling place

gen C_milage = 0.565 //federal milage reimbursement rate

gen T_processregistration = 0.0833 //average time in hours for clerks to
process registration form

gen C_t2pererror = (C_WImedianleisurewage * (T_roundtrip + T_search +
T_reregister)) + (Dist_drive * C_milage) + (C_staff *
T_processregistration)
```

```
*percentage of voters registered in NCOA*
gen P_ncoavoters_yr1 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr2 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr3 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr4 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr5 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr6 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr7 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr8 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr9 = (0.03 + (0.02 * runiform()))
gen P_ncoavoters_yr10 = (0.03 + (0.02 * runiform()))

*percentage of movers who have registered with the NCOA*
gen P_ncoamovers_yr1 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr2 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr3 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr4 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr5 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr6 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr7 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr8 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr9 = (0.60 + (0.07 * runiform()))
gen P_ncoamovers_yr10 = (0.60 + (0.07 * runiform()))

*percentage of voters who have moved*
gen P_movers_yr1 = ((P_ncoavoters_yr1)/P_ncoamovers_yr1)
gen P_movers_yr2 = ((P_ncoavoters_yr2)/P_ncoamovers_yr2)
gen P_movers_yr3 = ((P_ncoavoters_yr3)/P_ncoamovers_yr3)
gen P_movers_yr4 = ((P_ncoavoters_yr4)/P_ncoamovers_yr4)
gen P_movers_yr5 = ((P_ncoavoters_yr5)/P_ncoamovers_yr5)
gen P_movers_yr6 = ((P_ncoavoters_yr6)/P_ncoamovers_yr6)
gen P_movers_yr7 = ((P_ncoavoters_yr7)/P_ncoamovers_yr7)
gen P_movers_yr8 = ((P_ncoavoters_yr8)/P_ncoamovers_yr8)
gen P_movers_yr9 = ((P_ncoavoters_yr9)/P_ncoamovers_yr9)
```

```
gen P_movers_yr10 = ((P_ncoavoters_yr10)/P_ncoamovers_yr10)

*Percentage of voters who will be inactive*
gen P_inactive_yr1 = (0.0675 + (0.015 * runiform()))
gen P_inactive_yr2 = 0
gen P_inactive_yr3 = (0.0675 + (0.015 * runiform()))
gen P_inactive_yr4 = 0
gen P_inactive_yr5 = (0.0675 + (0.015 * runiform()))
gen P_inactive_yr6 = 0
gen P_inactive_yr7 = (0.0675 + (0.015 * runiform()))
gen P_inactive_yr8 = 0
gen P_inactive_yr9 = (0.0675 + (0.015 * runiform()))
gen P_inactive_yr10 = 0

*Expected percentage of inactive voters not on NCOA*
gen P_inactivenoncoa_yr1 = P_inactive_yr1 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr2 = P_inactive_yr2 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr3 = P_inactive_yr3 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr4 = P_inactive_yr4 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr5 = P_inactive_yr5 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr6 = P_inactive_yr6 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr7 = P_inactive_yr7 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr8 = P_inactive_yr8 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr9 = P_inactive_yr9 * (0.70 + (0.10 * runiform()))
gen P_inactivenoncoa_yr10 = P_inactive_yr10 * (0.70 + (0.10 * runiform()))



////////////////////////////////////
// Generate Current Policy Costs //
////////////////////////////////////

*Number of registered voters at the time of VLM*
gen N_SQvoters_yr1 = (3493927 + (150278 * runiform()))
gen N_SQvoters_yr2 = (3493927 + (150278 * runiform()))
```

```
gen N_SQvoters_yr3 = (3493927 + (150278 * runiform()))
gen N_SQvoters_yr4 = (3493927 + (150278 * runiform()))
gen N_SQvoters_yr5 = (3493927 + (150278 * runiform()))
gen N_SQvoters_yr6 = (3493927 + (150278 * runiform()))
gen N_SQvoters_yr7 = (3493927 + (150278 * runiform()))
gen N_SQvoters_yr8 = (3493927 + (150278 * runiform()))
gen N_SQvoters_yr9 = (3493927 + (150278 * runiform()))
gen N_SQvoters_yr10 = (3493927 + (150278 * runiform()))

*Number of postcards sent*
gen N_SQcards_yr1 = N_SQvoters_yr1 * P_inactive_yr1
gen N_SQcards_yr2 = N_SQvoters_yr2 * P_inactive_yr2
gen N_SQcards_yr3 = N_SQvoters_yr3 * P_inactive_yr3
gen N_SQcards_yr4 = N_SQvoters_yr4 * P_inactive_yr4
gen N_SQcards_yr5 = N_SQvoters_yr5 * P_inactive_yr5
gen N_SQcards_yr6 = N_SQvoters_yr6 * P_inactive_yr6
gen N_SQcards_yr7 = N_SQvoters_yr7 * P_inactive_yr7
gen N_SQcards_yr8 = N_SQvoters_yr8 * P_inactive_yr8
gen N_SQcards_yr9 = N_SQvoters_yr9 * P_inactive_yr9
gen N_SQcards_yr10 = N_SQvoters_yr10 * P_inactive_yr10

*Cost of Printing*
gen C_SQprinting_yr1 = N_SQcards_yr1 * C_printingpercard
gen C_SQprinting_yr2 = N_SQcards_yr2 * C_printingpercard
gen C_SQprinting_yr3 = N_SQcards_yr3 * C_printingpercard
gen C_SQprinting_yr4 = N_SQcards_yr4 * C_printingpercard
gen C_SQprinting_yr5 = N_SQcards_yr5 * C_printingpercard
gen C_SQprinting_yr6 = N_SQcards_yr6 * C_printingpercard
gen C_SQprinting_yr7 = N_SQcards_yr7 * C_printingpercard
gen C_SQprinting_yr8 = N_SQcards_yr8 * C_printingpercard
gen C_SQprinting_yr9 = N_SQcards_yr9 * C_printingpercard
gen C_SQprinting_yr10 = N_SQcards_yr10 * C_printingpercard

*Cost of Mailing*
```

```
gen C_SQmailing_yr1 = N_SQcards_yr1 * C_mailingpercard
gen C_SQmailing_yr2 = N_SQcards_yr2 * C_mailingpercard
gen C_SQmailing_yr3 = N_SQcards_yr3 * C_mailingpercard
gen C_SQmailing_yr4 = N_SQcards_yr4 * C_mailingpercard
gen C_SQmailing_yr5 = N_SQcards_yr5 * C_mailingpercard
gen C_SQmailing_yr6 = N_SQcards_yr6 * C_mailingpercard
gen C_SQmailing_yr7 = N_SQcards_yr7 * C_mailingpercard
gen C_SQmailing_yr8 = N_SQcards_yr8 * C_mailingpercard
gen C_SQmailing_yr9 = N_SQcards_yr9 * C_mailingpercard
gen C_SQmailing_yr10 = N_SQcards_yr10 * C_mailingpercard

*percentage of mailed cards that will be returned requesting continuation*
gen P_SQcontinuation_yr1 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr2 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr3 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr4 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr5 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr6 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr7 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr8 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr9 = (0.05 + (0.03 * runiform()))
gen P_SQcontinuation_yr10 = (0.05 + (0.03 * runiform()))

*Staff Cost of Processing Requests for Continuation*
gen C_SQcontinuation_yr1 = C_percont * N_SQcards_yr1 * P_SQcontinuation_yr1
gen C_SQcontinuation_yr2 = C_percont * N_SQcards_yr2 * P_SQcontinuation_yr2
gen C_SQcontinuation_yr3 = C_percont * N_SQcards_yr3 * P_SQcontinuation_yr3
gen C_SQcontinuation_yr4 = C_percont * N_SQcards_yr4 * P_SQcontinuation_yr4
gen C_SQcontinuation_yr5 = C_percont * N_SQcards_yr5 * P_SQcontinuation_yr5
gen C_SQcontinuation_yr6 = C_percont * N_SQcards_yr6 * P_SQcontinuation_yr6
gen C_SQcontinuation_yr7 = C_percont * N_SQcards_yr7 * P_SQcontinuation_yr7
gen C_SQcontinuation_yr8 = C_percont * N_SQcards_yr8 * P_SQcontinuation_yr8
gen C_SQcontinuation_yr9 = C_percont * N_SQcards_yr9 * P_SQcontinuation_yr9
gen C_SQcontinuation_yr10 = C_percont * N_SQcards_yr10 *
P_SQcontinuation_yr10
```

```
*percentage of mailed cards that will be returned as undeliverable*

gen P_SQundeliverable_yr1 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr2 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr3 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr4 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr5 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr6 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr7 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr8 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr9 = (0.25 + (0.125 * runiform()))

gen P_SQundeliverable_yr10 = (0.25 + (0.125 * runiform()))


*Staff Cost of Processing Undeliverable Postcards*

gen C_SQundeliverable_yr1 = C_perundeliv * N_SQcards_yr1 *
P_SQundeliverable_yr1

gen C_SQundeliverable_yr2 = C_perundeliv * N_SQcards_yr2 *
P_SQundeliverable_yr2

gen C_SQundeliverable_yr3 = C_perundeliv * N_SQcards_yr3 *
P_SQundeliverable_yr3

gen C_SQundeliverable_yr4 = C_perundeliv * N_SQcards_yr4 *
P_SQundeliverable_yr4

gen C_SQundeliverable_yr5 = C_perundeliv * N_SQcards_yr5 *
P_SQundeliverable_yr5

gen C_SQundeliverable_yr6 = C_perundeliv * N_SQcards_yr6 *
P_SQundeliverable_yr6

gen C_SQundeliverable_yr7 = C_perundeliv * N_SQcards_yr7 *
P_SQundeliverable_yr7

gen C_SQundeliverable_yr8 = C_perundeliv * N_SQcards_yr8 *
P_SQundeliverable_yr8

gen C_SQundeliverable_yr9 = C_perundeliv * N_SQcards_yr9 *
P_SQundeliverable_yr9

gen C_SQundeliverable_yr10 = C_perundeliv * N_SQcards_yr10 *
P_SQundeliverable_yr10


*Total Staff Costs*

gen C_SQstaff_yr1 = C_SQcontinuation_yr1 + C_SQundeliverable_yr1

gen C_SQstaff_yr2 = C_SQcontinuation_yr2 + C_SQundeliverable_yr2
```

```
gen C_SQstaff_yr3 = C_SQcontinuation_yr3 + C_SQundeliverable_yr3

gen C_SQstaff_yr4 = C_SQcontinuation_yr4 + C_SQundeliverable_yr4

gen C_SQstaff_yr5 = C_SQcontinuation_yr5 + C_SQundeliverable_yr5

gen C_SQstaff_yr6 = C_SQcontinuation_yr6 + C_SQundeliverable_yr6

gen C_SQstaff_yr7 = C_SQcontinuation_yr7 + C_SQundeliverable_yr7

gen C_SQstaff_yr8 = C_SQcontinuation_yr8 + C_SQundeliverable_yr8

gen C_SQstaff_yr9 = C_SQcontinuation_yr9 + C_SQundeliverable_yr9

gen C_SQstaff_yr10 = C_SQcontinuation_yr10 + C_SQundeliverable_yr10


*Cost of New Type I Errors*

gen C_SQt1newerrors_yr1 = (N_SQvoters_yr1 * P_movers_yr1) * C_t1pererror

gen C_SQt1newerrors_yr2 = (N_SQvoters_yr2 * P_movers_yr2) * C_t1pererror

gen C_SQt1newerrors_yr3 = (N_SQvoters_yr3 * P_movers_yr3) * C_t1pererror

gen C_SQt1newerrors_yr4 = (N_SQvoters_yr4 * P_movers_yr4) * C_t1pererror

gen C_SQt1newerrors_yr5 = (N_SQvoters_yr5 * P_movers_yr5) * C_t1pererror

gen C_SQt1newerrors_yr6 = (N_SQvoters_yr6 * P_movers_yr6) * C_t1pererror

gen C_SQt1newerrors_yr7 = (N_SQvoters_yr7 * P_movers_yr7) * C_t1pererror

gen C_SQt1newerrors_yr8 = (N_SQvoters_yr8 * P_movers_yr8) * C_t1pererror

gen C_SQt1newerrors_yr9 = (N_SQvoters_yr9 * P_movers_yr9) * C_t1pererror

gen C_SQt1newerrors_yr10 = (N_SQvoters_yr10 * P_movers_yr10) * C_t1pererror


*Total Costs of Type I Errors*

gen C_SQt1errors_yr1 = C_SQt1newerrors_yr1

gen C_SQt1errors_yr2 = C_SQt1newerrors_yr1 + C_SQt1newerrors_yr2

gen C_SQt1errors_yr3 = C_SQt1newerrors_yr1 + C_SQt1newerrors_yr2 +
C_SQt1newerrors_yr3

gen C_SQt1errors_yr4 = C_SQt1newerrors_yr1 + C_SQt1newerrors_yr2 +
C_SQt1newerrors_yr3 + C_SQt1newerrors_yr4

gen C_SQt1errors_yr5 = C_SQt1newerrors_yr3 + C_SQt1newerrors_yr4 +
C_SQt1newerrors_yr5

gen C_SQt1errors_yr6 = C_SQt1newerrors_yr3 + C_SQt1newerrors_yr4 +
C_SQt1newerrors_yr5 + C_SQt1newerrors_yr6

gen C_SQt1errors_yr7 = C_SQt1newerrors_yr5 + C_SQt1newerrors_yr6 +
C_SQt1newerrors_yr7

gen C_SQt1errors_yr8 = C_SQt1newerrors_yr5 + C_SQt1newerrors_yr6 +
C_SQt1newerrors_yr7 + C_SQt1newerrors_yr8
```

```
gen C_SQt1errors_yr9 = C_SQt1newerrors_yr7 + C_SQt1newerrors_yr8 +
C_SQt1newerrors_yr9

gen C_SQt1errors_yr10 = C_SQt1newerrors_yr7 + C_SQt1newerrors_yr8 +
C_SQt1newerrors_yr9 + C_SQt1newerrors_yr10


*Percentage of Type II Errors*

gen P_SQt2errors_yr1 = P_SQcontinuation_yr1 * runiform()

gen P_SQt2errors_yr2 = P_SQcontinuation_yr2 * runiform()

gen P_SQt2errors_yr3 = P_SQcontinuation_yr3 * runiform()

gen P_SQt2errors_yr4 = P_SQcontinuation_yr4 * runiform()

gen P_SQt2errors_yr5 = P_SQcontinuation_yr5 * runiform()

gen P_SQt2errors_yr6 = P_SQcontinuation_yr6 * runiform()

gen P_SQt2errors_yr7 = P_SQcontinuation_yr7 * runiform()

gen P_SQt2errors_yr8 = P_SQcontinuation_yr8 * runiform()

gen P_SQt2errors_yr9 = P_SQcontinuation_yr9 * runiform()

gen P_SQt2errors_yr10 = P_SQcontinuation_yr10 * runiform()


*Cost of Type II Errors*

gen C_SQt2errors_yr1 = N_SQcards_yr1 * P_SQt2errors_yr1 * C_t2pererror

gen C_SQt2errors_yr2 = N_SQcards_yr2 * P_SQt2errors_yr2 * C_t2pererror

gen C_SQt2errors_yr3 = N_SQcards_yr3 * P_SQt2errors_yr3 * C_t2pererror

gen C_SQt2errors_yr4 = N_SQcards_yr4 * P_SQt2errors_yr4 * C_t2pererror

gen C_SQt2errors_yr5 = N_SQcards_yr5 * P_SQt2errors_yr5 * C_t2pererror

gen C_SQt2errors_yr6 = N_SQcards_yr6 * P_SQt2errors_yr6 * C_t2pererror

gen C_SQt2errors_yr7 = N_SQcards_yr7 * P_SQt2errors_yr7 * C_t2pererror

gen C_SQt2errors_yr8 = N_SQcards_yr8 * P_SQt2errors_yr8 * C_t2pererror

gen C_SQt2errors_yr9 = N_SQcards_yr9 * P_SQt2errors_yr9 * C_t2pererror

gen C_SQt2errors_yr10 = N_SQcards_yr10 * P_SQt2errors_yr10 * C_t2pererror


*Calculate Discounted Net Present Value*

gen C_SQyear1 = (C_SQprinting_yr1 + C_SQmailing_yr1 + C_SQstaff_yr1 +
C_SQt1errors_yr1 + C_SQt2errors_yr1)/((1 + discountrate)^0.5)

gen C_SQyear2 = (C_SQprinting_yr2 + C_SQmailing_yr2 + C_SQstaff_yr2 +
C_SQt1errors_yr2 + C_SQt2errors_yr2)/((1 + discountrate)^1.5)

gen C_SQyear3 = (C_SQprinting_yr3 + C_SQmailing_yr3 + C_SQstaff_yr3 +
C_SQt1errors_yr3 + C_SQt2errors_yr3)/((1 + discountrate)^2.5)
```

```
gen C_SQyear4 = (C_SQprinting_yr4 + C_SQmailing_yr4 + C_SQstaff_yr4 +
C_SQt1errors_yr4 + C_SQt2errors_yr4)/((1 + discountrate)^3.5)

gen C_SQyear5 = (C_SQprinting_yr5 + C_SQmailing_yr5 + C_SQstaff_yr5 +
C_SQt1errors_yr5 + C_SQt2errors_yr5)/((1 + discountrate)^4.5)

gen C_SQyear6 = (C_SQprinting_yr6 + C_SQmailing_yr6 + C_SQstaff_yr6 +
C_SQt1errors_yr6 + C_SQt2errors_yr6)/((1 + discountrate)^5.5)

gen C_SQyear7 = (C_SQprinting_yr7 + C_SQmailing_yr7 + C_SQstaff_yr7 +
C_SQt1errors_yr7 + C_SQt2errors_yr7)/((1 + discountrate)^6.5)

gen C_SQyear8 = (C_SQprinting_yr8 + C_SQmailing_yr8 + C_SQstaff_yr8 +
C_SQt1errors_yr8 + C_SQt2errors_yr8)/((1 + discountrate)^7.5)

gen C_SQyear9 = (C_SQprinting_yr9 + C_SQmailing_yr9 + C_SQstaff_yr9 +
C_SQt1errors_yr9 + C_SQt2errors_yr9)/((1 + discountrate)^8.5)

gen C_SQyear10 = (C_SQprinting_yr10 + C_SQmailing_yr10 + C_SQstaff_yr10 +
C_SQt1errors_yr10 + C_SQt2errors_yr10)/((1 + discountrate)^9.5)


*Calculate Total Net Present Value*

gen C_SQtotal = C_SQyear1 + C_SQyear2 + C_SQyear3 + C_SQyear4 + C_SQyear5 +
C_SQyear6 + C_SQyear7 + C_SQyear8 + C_SQyear9 + C_SQyear10


////////////////////////////

// Generate NCOA-only Costs //

////////////////////////////


*Number of registered voters at the time of VLM*

gen N_NCvoters_yr1 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr2 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr3 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr4 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr5 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr6 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr7 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr8 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr9 = (3286011 + (106917 * runiform()))

gen N_NCvoters_yr10 = (3286011 + (106917 * runiform()))


*Number of postcards sent*

gen N_NCcards_yr1 = N_NCvoters_yr1 * P_ncoavoters_yr1

gen N_NCcards_yr2 = N_NCvoters_yr2 * P_ncoavoters_yr2
```

```
gen N_NCcards_yr3 = N_NCvoters_yr3 * P_ncoavoters_yr3
gen N_NCcards_yr4 = N_NCvoters_yr4 * P_ncoavoters_yr4
gen N_NCcards_yr5 = N_NCvoters_yr5 * P_ncoavoters_yr5
gen N_NCcards_yr6 = N_NCvoters_yr6 * P_ncoavoters_yr6
gen N_NCcards_yr7 = N_NCvoters_yr7 * P_ncoavoters_yr7
gen N_NCcards_yr8 = N_NCvoters_yr8 * P_ncoavoters_yr8
gen N_NCcards_yr9 = N_NCvoters_yr9 * P_ncoavoters_yr9
gen N_NCcards_yr10 = N_NCvoters_yr10 * P_ncoavoters_yr10

*Cost of Printing*
gen C_NCprinting_yr1 = N_NCcards_yr1 * C_printingpercard
gen C_NCprinting_yr2 = N_NCcards_yr2 * C_printingpercard
gen C_NCprinting_yr3 = N_NCcards_yr3 * C_printingpercard
gen C_NCprinting_yr4 = N_NCcards_yr4 * C_printingpercard
gen C_NCprinting_yr5 = N_NCcards_yr5 * C_printingpercard
gen C_NCprinting_yr6 = N_NCcards_yr6 * C_printingpercard
gen C_NCprinting_yr7 = N_NCcards_yr7 * C_printingpercard
gen C_NCprinting_yr8 = N_NCcards_yr8 * C_printingpercard
gen C_NCprinting_yr9 = N_NCcards_yr9 * C_printingpercard
gen C_NCprinting_yr10 = N_NCcards_yr10 * C_printingpercard

*Cost of Mailing*
gen C_NCmailing_yr1 = N_NCcards_yr1 * C_mailingpercard
gen C_NCmailing_yr2 = N_NCcards_yr2 * C_mailingpercard
gen C_NCmailing_yr3 = N_NCcards_yr3 * C_mailingpercard
gen C_NCmailing_yr4 = N_NCcards_yr4 * C_mailingpercard
gen C_NCmailing_yr5 = N_NCcards_yr5 * C_mailingpercard
gen C_NCmailing_yr6 = N_NCcards_yr6 * C_mailingpercard
gen C_NCmailing_yr7 = N_NCcards_yr7 * C_mailingpercard
gen C_NCmailing_yr8 = N_NCcards_yr8 * C_mailingpercard
gen C_NCmailing_yr9 = N_NCcards_yr9 * C_mailingpercard
gen C_NCmailing_yr10 = N_NCcards_yr10 * C_mailingpercard

*percentage of mailed cards that will be returned requesting continuation*
```

```
gen P_NCcontinuation_yr1 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr2 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr3 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr4 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr5 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr6 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr7 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr8 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr9 = (0.01 + (0.005 * runiform()))
gen P_NCcontinuation_yr10 = (0.01 + (0.005 * runiform()))

*Staff Cost of Processing Requests for Continuation*
gen C_NCcontinuation_yr1 = C_percont * N_NCcards_yr1 * P_NCcontinuation_yr1
gen C_NCcontinuation_yr2 = C_percont * N_NCcards_yr2 * P_NCcontinuation_yr2
gen C_NCcontinuation_yr3 = C_percont * N_NCcards_yr3 * P_NCcontinuation_yr3
gen C_NCcontinuation_yr4 = C_percont * N_NCcards_yr4 * P_NCcontinuation_yr4
gen C_NCcontinuation_yr5 = C_percont * N_NCcards_yr5 * P_NCcontinuation_yr5
gen C_NCcontinuation_yr6 = C_percont * N_NCcards_yr6 * P_NCcontinuation_yr6
gen C_NCcontinuation_yr7 = C_percont * N_NCcards_yr7 * P_NCcontinuation_yr7
gen C_NCcontinuation_yr8 = C_percont * N_NCcards_yr8 * P_NCcontinuation_yr8
gen C_NCcontinuation_yr9 = C_percont * N_NCcards_yr9 * P_NCcontinuation_yr9
gen C_NCcontinuation_yr10 = C_percont * N_NCcards_yr10 *
P_NCcontinuation_yr10

*percentage of mailed cards that will be returned as undeliverable*
gen P_NCundeliverable_yr1 = 0.1436
gen P_NCundeliverable_yr2 = 0.1436
gen P_NCundeliverable_yr3 = 0.1436
gen P_NCundeliverable_yr4 = 0.1436
gen P_NCundeliverable_yr5 = 0.1436
gen P_NCundeliverable_yr6 = 0.1436
gen P_NCundeliverable_yr7 = 0.1436
gen P_NCundeliverable_yr8 = 0.1436
gen P_NCundeliverable_yr9 = 0.1436
gen P_NCundeliverable_yr10 = 0.1436
```

```
*Staff Cost of Processing Undeliverable Postcards*

gen C_NCundeliverable_yr1 = C_perundeliv * N_NCcards_yr1 *
P_NCundeliverable_yr1

gen C_NCundeliverable_yr2 = C_perundeliv * N_NCcards_yr2 *
P_NCundeliverable_yr2

gen C_NCundeliverable_yr3 = C_perundeliv * N_NCcards_yr3 *
P_NCundeliverable_yr3

gen C_NCundeliverable_yr4 = C_perundeliv * N_NCcards_yr4 *
P_NCundeliverable_yr4

gen C_NCundeliverable_yr5 = C_perundeliv * N_NCcards_yr5 *
P_NCundeliverable_yr5

gen C_NCundeliverable_yr6 = C_perundeliv * N_NCcards_yr6 *
P_NCundeliverable_yr6

gen C_NCundeliverable_yr7 = C_perundeliv * N_NCcards_yr7 *
P_NCundeliverable_yr7

gen C_NCundeliverable_yr8 = C_perundeliv * N_NCcards_yr8 *
P_NCundeliverable_yr8

gen C_NCundeliverable_yr9 = C_perundeliv * N_NCcards_yr9 *
P_NCundeliverable_yr9

gen C_NCundeliverable_yr10 = C_perundeliv * N_NCcards_yr10 *
P_NCundeliverable_yr10


*Total Staff Costs*

gen C_NCstaff_yr1 = C_NCcontinuation_yr1 + C_NCundeliverable_yr1

gen C_NCstaff_yr2 = C_NCcontinuation_yr2 + C_NCundeliverable_yr2

gen C_NCstaff_yr3 = C_NCcontinuation_yr3 + C_NCundeliverable_yr3

gen C_NCstaff_yr4 = C_NCcontinuation_yr4 + C_NCundeliverable_yr4

gen C_NCstaff_yr5 = C_NCcontinuation_yr5 + C_NCundeliverable_yr5

gen C_NCstaff_yr6 = C_NCcontinuation_yr6 + C_NCundeliverable_yr6

gen C_NCstaff_yr7 = C_NCcontinuation_yr7 + C_NCundeliverable_yr7

gen C_NCstaff_yr8 = C_NCcontinuation_yr8 + C_NCundeliverable_yr8

gen C_NCstaff_yr9 = C_NCcontinuation_yr9 + C_NCundeliverable_yr9

gen C_NCstaff_yr10 = C_NCcontinuation_yr10 + C_NCundeliverable_yr10


*Cost of New Type I Errors*

gen C_NCt1newerrors_yr1 = (((N_NCcards_yr1/P_ncoamovers_yr1) -
N_NCcards_yr1) * C_t1pererror)
```

```
gen C_NCt1newerrors_yr2 = (((N_NCcards_yr2/P_ncoamovers_yr2) -
N_NCcards_yr2) * C_t1pererror)

gen C_NCt1newerrors_yr3 = (((N_NCcards_yr3/P_ncoamovers_yr3) -
N_NCcards_yr3) * C_t1pererror)

gen C_NCt1newerrors_yr4 = (((N_NCcards_yr4/P_ncoamovers_yr4) -
N_NCcards_yr4) * C_t1pererror)

gen C_NCt1newerrors_yr5 = (((N_NCcards_yr5/P_ncoamovers_yr5) -
N_NCcards_yr5) * C_t1pererror)

gen C_NCt1newerrors_yr6 = (((N_NCcards_yr6/P_ncoamovers_yr6) -
N_NCcards_yr6) * C_t1pererror)

gen C_NCt1newerrors_yr7 = (((N_NCcards_yr7/P_ncoamovers_yr7) -
N_NCcards_yr7) * C_t1pererror)

gen C_NCt1newerrors_yr8 = (((N_NCcards_yr8/P_ncoamovers_yr8) -
N_NCcards_yr8) * C_t1pererror)

gen C_NCt1newerrors_yr9 = (((N_NCcards_yr9/P_ncoamovers_yr9) -
N_NCcards_yr9) * C_t1pererror)

gen C_NCt1newerrors_yr10 = (((N_NCcards_yr10/P_ncoamovers_yr10) -
N_NCcards_yr10) * C_t1pererror)


*Total Costs of Type I Errors*

gen C_NCt1errors_yr1 = C_NCt1newerrors_yr1

gen C_NCt1errors_yr2 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2

gen C_NCt1errors_yr3 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2 +
C_NCt1newerrors_yr3

gen C_NCt1errors_yr4 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2 +
C_NCt1newerrors_yr3 + C_NCt1newerrors_yr4

gen C_NCt1errors_yr5 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2 +
C_NCt1newerrors_yr3 + C_NCt1newerrors_yr4 + C_NCt1newerrors_yr5

gen C_NCt1errors_yr6 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2 +
C_NCt1newerrors_yr3 + C_NCt1newerrors_yr4 + C_NCt1newerrors_yr5 +
C_NCt1newerrors_yr6

gen C_NCt1errors_yr7 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2 +
C_NCt1newerrors_yr3 + C_NCt1newerrors_yr4 + C_NCt1newerrors_yr5 +
C_NCt1newerrors_yr6 + C_NCt1newerrors_yr7

gen C_NCt1errors_yr8 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2 +
C_NCt1newerrors_yr3 + C_NCt1newerrors_yr4 + C_NCt1newerrors_yr5 +
C_NCt1newerrors_yr6 + C_NCt1newerrors_yr7 + C_NCt1newerrors_yr8

gen C_NCt1errors_yr9 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2 +
C_NCt1newerrors_yr3 + C_NCt1newerrors_yr4 + C_NCt1newerrors_yr5 +
C_NCt1newerrors_yr6 + C_NCt1newerrors_yr7 + C_NCt1newerrors_yr8 +
C_NCt1newerrors_yr9

gen C_NCt1errors_yr10 = C_NCt1newerrors_yr1 + C_NCt1newerrors_yr2 +
C_NCt1newerrors_yr3 + C_NCt1newerrors_yr4 + C_NCt1newerrors_yr5 +
```

```
C_NCt1newerrors_yr6 + C_NCt1newerrors_yr7 + C_NCt1newerrors_yr8 +
C_NCt1newerrors_yr9 + C_NCt1newerrors_yr10


*Percentage of Type II Errors*

gen P_NCt2errors_yr1 = P_NCcontinuation_yr1 * runiform()

gen P_NCt2errors_yr2 = P_NCcontinuation_yr2 * runiform()

gen P_NCt2errors_yr3 = P_NCcontinuation_yr3 * runiform()

gen P_NCt2errors_yr4 = P_NCcontinuation_yr4 * runiform()

gen P_NCt2errors_yr5 = P_NCcontinuation_yr5 * runiform()

gen P_NCt2errors_yr6 = P_NCcontinuation_yr6 * runiform()

gen P_NCt2errors_yr7 = P_NCcontinuation_yr7 * runiform()

gen P_NCt2errors_yr8 = P_NCcontinuation_yr8 * runiform()

gen P_NCt2errors_yr9 = P_NCcontinuation_yr9 * runiform()

gen P_NCt2errors_yr10 = P_NCcontinuation_yr10 * runiform()


*Cost of Type II Errors*

gen C_NCt2errors_yr1 = N_NCcards_yr1 * P_NCt2errors_yr1 * C_t2pererror

gen C_NCt2errors_yr2 = N_NCcards_yr2 * P_NCt2errors_yr2 * C_t2pererror

gen C_NCt2errors_yr3 = N_NCcards_yr3 * P_NCt2errors_yr3 * C_t2pererror

gen C_NCt2errors_yr4 = N_NCcards_yr4 * P_NCt2errors_yr4 * C_t2pererror

gen C_NCt2errors_yr5 = N_NCcards_yr5 * P_NCt2errors_yr5 * C_t2pererror

gen C_NCt2errors_yr6 = N_NCcards_yr6 * P_NCt2errors_yr6 * C_t2pererror

gen C_NCt2errors_yr7 = N_NCcards_yr7 * P_NCt2errors_yr7 * C_t2pererror

gen C_NCt2errors_yr8 = N_NCcards_yr8 * P_NCt2errors_yr8 * C_t2pererror

gen C_NCt2errors_yr9 = N_NCcards_yr9 * P_NCt2errors_yr9 * C_t2pererror

gen C_NCt2errors_yr10 = N_NCcards_yr10 * P_NCt2errors_yr10 * C_t2pererror


*Calculate Discounted Net Present Value*

gen C_NCyear1 = (C_ncoa + C_NCprinting_yr1 + C_NCmailing_yr1 +
C_NCstaff_yr1 + C_NCt1errors_yr1 + C_NCt2errors_yr1)/((1+discountrate)^0.5)

gen C_NCyear2 = (C_ncoa + C_NCprinting_yr2 + C_NCmailing_yr2 +
C_NCstaff_yr2 + C_NCt1errors_yr2 + C_NCt2errors_yr2)/((1+discountrate)^1.5)

gen C_NCyear3 = (C_ncoa + C_NCprinting_yr3 + C_NCmailing_yr3 +
C_NCstaff_yr3 + C_NCt1errors_yr3 + C_NCt2errors_yr3)/((1+discountrate)^2.5)

gen C_NCyear4 = (C_ncoa + C_NCprinting_yr4 + C_NCmailing_yr4 +
C_NCstaff_yr4 + C_NCt1errors_yr4 + C_NCt2errors_yr4)/((1+discountrate)^3.5)
```

```
gen C_NCyear5 = (C_ncoa + C_NCprinting_yr5 + C_NCmailing_yr5 +
C_NCstaff_yr5 + C_NCt1errors_yr5 + C_NCt2errors_yr5)/((1+discountrate)^4.5)

gen C_NCyear6 = (C_ncoa + C_NCprinting_yr6 + C_NCmailing_yr6 +
C_NCstaff_yr6 + C_NCt1errors_yr6 + C_NCt2errors_yr6)/((1+discountrate)^5.5)

gen C_NCyear7 = (C_ncoa + C_NCprinting_yr7 + C_NCmailing_yr7 +
C_NCstaff_yr7 + C_NCt1errors_yr7 + C_NCt2errors_yr7)/((1+discountrate)^6.5)

gen C_NCyear8 = (C_ncoa + C_NCprinting_yr8 + C_NCmailing_yr8 +
C_NCstaff_yr8 + C_NCt1errors_yr8 + C_NCt2errors_yr8)/((1+discountrate)^7.5)

gen C_NCyear9 = (C_ncoa + C_NCprinting_yr9 + C_NCmailing_yr9 +
C_NCstaff_yr9 + C_NCt1errors_yr9 + C_NCt2errors_yr9)/((1+discountrate)^8.5)

gen C_NCyear10 = (C_ncoa + C_NCprinting_yr10 + C_NCmailing_yr10 +
C_NCstaff_yr10 + C_NCt1errors_yr10 +
C_NCt2errors_yr10)/((1+discountrate)^9.5)


*Calculate Total Net Present Value*

gen C_NCtotal = C_startup + C_NCyear1 + C_NCyear2 + C_NCyear3 + C_NCyear4 +
C_NCyear5 + C_NCyear6 + C_NCyear7 + C_NCyear8 + C_NCyear9 + C_NCyear10

gen C_NCadjusted = C_SQtotal - C_NCtotal


////////////////////////////////

// Generate Hybrid Option Costs //

////////////////////////////////


*Number of Registered Voters at the Time of VLM*

gen N_HYvoters_yr1 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr2 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr3 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr4 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr5 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr6 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr7 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr8 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr9 = (3286011 + (106917 * runiform()))

gen N_HYvoters_yr10 = (3286011 + (106917 * runiform()))


*Size of NCOA Mailing*

gen N_HYAcards_yr1 = N_HYvoters_yr1 * P_ncoavoters_yr1

gen N_HYAcards_yr2 = N_HYvoters_yr2 * P_ncoavoters_yr2
```

```
gen N_HYAcards_yr3 = N_HYvoters_yr3 * P_ncoavoters_yr3

gen N_HYAcards_yr4 = N_HYvoters_yr4 * P_ncoavoters_yr4

gen N_HYAcards_yr5 = N_HYvoters_yr5 * P_ncoavoters_yr5

gen N_HYAcards_yr6 = N_HYvoters_yr6 * P_ncoavoters_yr6

gen N_HYAcards_yr7 = N_HYvoters_yr7 * P_ncoavoters_yr7

gen N_HYAcards_yr8 = N_HYvoters_yr8 * P_ncoavoters_yr8

gen N_HYAcards_yr9 = N_HYvoters_yr9 * P_ncoavoters_yr9

gen N_HYAcards_yr10 = N_HYvoters_yr10 * P_ncoavoters_yr10


*Size of Mass Mailing*

gen N_HYBcards_yr1 = N_HYvoters_yr1 * P_inactivenoncoa_yr1

gen N_HYBcards_yr2 = N_HYvoters_yr2 * P_inactivenoncoa_yr2

gen N_HYBcards_yr3 = N_HYvoters_yr3 * P_inactivenoncoa_yr3

gen N_HYBcards_yr4 = N_HYvoters_yr4 * P_inactivenoncoa_yr4

gen N_HYBcards_yr5 = N_HYvoters_yr5 * P_inactivenoncoa_yr5

gen N_HYBcards_yr6 = N_HYvoters_yr6 * P_inactivenoncoa_yr6

gen N_HYBcards_yr7 = N_HYvoters_yr7 * P_inactivenoncoa_yr7

gen N_HYBcards_yr8 = N_HYvoters_yr8 * P_inactivenoncoa_yr8

gen N_HYBcards_yr9 = N_HYvoters_yr9 * P_inactivenoncoa_yr9

gen N_HYBcards_yr10 = N_HYvoters_yr10 * P_inactivenoncoa_yr10


*Cost of Printing*

gen C_HYprinting_yr1 = (N_HYAcards_yr1 + N_HYBcards_yr1) *
C_printingpercard

gen C_HYprinting_yr2 = (N_HYAcards_yr2 + N_HYBcards_yr2) *
C_printingpercard

gen C_HYprinting_yr3 = (N_HYAcards_yr3 + N_HYBcards_yr3) *
C_printingpercard

gen C_HYprinting_yr4 = (N_HYAcards_yr4 + N_HYBcards_yr4) *
C_printingpercard

gen C_HYprinting_yr5 = (N_HYAcards_yr5 + N_HYBcards_yr5) *
C_printingpercard

gen C_HYprinting_yr6 = (N_HYAcards_yr6 + N_HYBcards_yr6) *
C_printingpercard

gen C_HYprinting_yr7 = (N_HYAcards_yr7 + N_HYBcards_yr7) *
C_printingpercard

gen C_HYprinting_yr8 = (N_HYAcards_yr8 + N_HYBcards_yr8) *
C_printingpercard
```

```
gen C_HYprinting_yr9 = (N_HYAcards_yr9 + N_HYBcards_yr9) *
C_printingpercard

gen C_HYprinting_yr10 = (N_HYAcards_yr10 + N_HYBcards_yr10) *
C_printingpercard


*Cost of Mailing*

gen C_HYmailing_yr1 = (N_HYAcards_yr1 + N_HYBcards_yr1) * C_mailingpercard

gen C_HYmailing_yr2 = (N_HYAcards_yr2 + N_HYBcards_yr2) * C_mailingpercard

gen C_HYmailing_yr3 = (N_HYAcards_yr3 + N_HYBcards_yr3) * C_mailingpercard

gen C_HYmailing_yr4 = (N_HYAcards_yr4 + N_HYBcards_yr4) * C_mailingpercard

gen C_HYmailing_yr5 = (N_HYAcards_yr5 + N_HYBcards_yr5) * C_mailingpercard

gen C_HYmailing_yr6 = (N_HYAcards_yr6 + N_HYBcards_yr6) * C_mailingpercard

gen C_HYmailing_yr7 = (N_HYAcards_yr7 + N_HYBcards_yr7) * C_mailingpercard

gen C_HYmailing_yr8 = (N_HYAcards_yr8 + N_HYBcards_yr8) * C_mailingpercard

gen C_HYmailing_yr9 = (N_HYAcards_yr9 + N_HYBcards_yr9) * C_mailingpercard

gen C_HYmailing_yr10 = (N_HYAcards_yr10 + N_HYBcards_yr10) *
C_mailingpercard


*percentage of mailed cards that will be returned requesting continuation
for NCOA mailings*

gen P_HYAcontinuation_yr1 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr2 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr3 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr4 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr5 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr6 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr7 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr8 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr9 = (0.01 + (0.005 * runiform()))

gen P_HYAcontinuation_yr10 = (0.01 + (0.005 * runiform()))


*percentage of mailed cards that will be returned requesting continuation
for Mass Mailings*

gen P_HYBcontinuation_yr1 = (0.05 + (0.03 * runiform()))

gen P_HYBcontinuation_yr2 = (0.05 + (0.03 * runiform()))

gen P_HYBcontinuation_yr3 = (0.05 + (0.03 * runiform()))
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```
gen P_HYBcontinuation_yr4 = (0.05 + (0.03 * runiform()))

gen P_HYBcontinuation_yr5 = (0.05 + (0.03 * runiform()))

gen P_HYBcontinuation_yr6 = (0.05 + (0.03 * runiform()))

gen P_HYBcontinuation_yr7 = (0.05 + (0.03 * runiform()))

gen P_HYBcontinuation_yr8 = (0.05 + (0.03 * runiform()))

gen P_HYBcontinuation_yr9 = (0.05 + (0.03 * runiform()))

gen P_HYBcontinuation_yr10 = (0.05 + (0.03 * runiform()))


*Staff Cost of Processing Requests for Continuation*

gen C_HYcontinuation_yr1 = ((N_HYAcards_yr1 * P_HYAcontinuation_yr1) +
(N_HYBcards_yr1 * P_HYBcontinuation_yr1)) * C_percont

gen C_HYcontinuation_yr2 = ((N_HYAcards_yr2 * P_HYAcontinuation_yr2) +
(N_HYBcards_yr2 * P_HYBcontinuation_yr2)) * C_percont

gen C_HYcontinuation_yr3 = ((N_HYAcards_yr3 * P_HYAcontinuation_yr3) +
(N_HYBcards_yr3 * P_HYBcontinuation_yr3)) * C_percont

gen C_HYcontinuation_yr4 = ((N_HYAcards_yr4 * P_HYAcontinuation_yr4) +
(N_HYBcards_yr4 * P_HYBcontinuation_yr4)) * C_percont

gen C_HYcontinuation_yr5 = ((N_HYAcards_yr5 * P_HYAcontinuation_yr5) +
(N_HYBcards_yr5 * P_HYBcontinuation_yr5)) * C_percont

gen C_HYcontinuation_yr6 = ((N_HYAcards_yr6 * P_HYAcontinuation_yr6) +
(N_HYBcards_yr6 * P_HYBcontinuation_yr6)) * C_percont

gen C_HYcontinuation_yr7 = ((N_HYAcards_yr7 * P_HYAcontinuation_yr7) +
(N_HYBcards_yr7 * P_HYBcontinuation_yr7)) * C_percont

gen C_HYcontinuation_yr8 = ((N_HYAcards_yr8 * P_HYAcontinuation_yr8) +
(N_HYBcards_yr8 * P_HYBcontinuation_yr8)) * C_percont

gen C_HYcontinuation_yr9 = ((N_HYAcards_yr9 * P_HYAcontinuation_yr9) +
(N_HYBcards_yr9 * P_HYBcontinuation_yr9)) * C_percont

gen C_HYcontinuation_yr10 = ((N_HYAcards_yr10 * P_HYAcontinuation_yr10) +
(N_HYBcards_yr10 * P_HYBcontinuation_yr10)) * C_percont


*percentage of mailed cards that will be returned as undeliverable for NCOA
mailings*

gen P_HYAundeliverable_yr1 = 0.1436

gen P_HYAundeliverable_yr2 = 0.1436

gen P_HYAundeliverable_yr3 = 0.1436

gen P_HYAundeliverable_yr4 = 0.1436

gen P_HYAundeliverable_yr5 = 0.1436

gen P_HYAundeliverable_yr6 = 0.1436

gen P_HYAundeliverable_yr7 = 0.1436
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gen P_HYAundeliverable_yr8 = 0.1436

gen P_HYAundeliverable_yr9 = 0.1436

gen P_HYAundeliverable_yr10 = 0.1436


*percentage of mailed cards that will be returned as undeliverable for Mass
Mailings (assumes 85% of undeliverable mail from SQ mailing will be caught
by NCOA)*

gen P_HYBundeliverable_yr1 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr2 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr3 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr4 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr5 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr6 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr7 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr8 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr9 = (0.063 + (0.044 * runiform()))

gen P_HYBundeliverable_yr10 = (0.063 + (0.044 * runiform()))


*Staff Cost of Processing Undeliverable Postcards*

gen C_HYundeliverable_yr1 = ((N_HYAcards_yr1 * P_HYAundeliverable_yr1) +
(N_HYBcards_yr1 * P_HYBundeliverable_yr1)) * C_perundeliv

gen C_HYundeliverable_yr2 = ((N_HYAcards_yr2 * P_HYAundeliverable_yr2) +
(N_HYBcards_yr2 * P_HYBundeliverable_yr2)) * C_perundeliv

gen C_HYundeliverable_yr3 = ((N_HYAcards_yr3 * P_HYAundeliverable_yr3) +
(N_HYBcards_yr3 * P_HYBundeliverable_yr3)) * C_perundeliv

gen C_HYundeliverable_yr4 = ((N_HYAcards_yr4 * P_HYAundeliverable_yr4) +
(N_HYBcards_yr4 * P_HYBundeliverable_yr4)) * C_perundeliv

gen C_HYundeliverable_yr5 = ((N_HYAcards_yr5 * P_HYAundeliverable_yr5) +
(N_HYBcards_yr5 * P_HYBundeliverable_yr5)) * C_perundeliv

gen C_HYundeliverable_yr6 = ((N_HYAcards_yr6 * P_HYAundeliverable_yr6) +
(N_HYBcards_yr6 * P_HYBundeliverable_yr6)) * C_perundeliv

gen C_HYundeliverable_yr7 = ((N_HYAcards_yr7 * P_HYAundeliverable_yr7) +
(N_HYBcards_yr7 * P_HYBundeliverable_yr7)) * C_perundeliv

gen C_HYundeliverable_yr8 = ((N_HYAcards_yr8 * P_HYAundeliverable_yr8) +
(N_HYBcards_yr8 * P_HYBundeliverable_yr8)) * C_perundeliv

gen C_HYundeliverable_yr9 = ((N_HYAcards_yr9 * P_HYAundeliverable_yr9) +
(N_HYBcards_yr9 * P_HYBundeliverable_yr9)) * C_perundeliv

gen C_HYundeliverable_yr10 = ((N_HYAcards_yr10 * P_HYAundeliverable_yr10) +
(N_HYBcards_yr10 * P_HYBundeliverable_yr10)) * C_perundeliv
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*Total Staff Costs*

gen C_HYstaff_yr1 = C_HYcontinuation_yr1 + C_HYundeliverable_yr1

gen C_HYstaff_yr2 = C_HYcontinuation_yr2 + C_HYundeliverable_yr2

gen C_HYstaff_yr3 = C_HYcontinuation_yr3 + C_HYundeliverable_yr3

gen C_HYstaff_yr4 = C_HYcontinuation_yr4 + C_HYundeliverable_yr4

gen C_HYstaff_yr5 = C_HYcontinuation_yr5 + C_HYundeliverable_yr5

gen C_HYstaff_yr6 = C_HYcontinuation_yr6 + C_HYundeliverable_yr6

gen C_HYstaff_yr7 = C_HYcontinuation_yr7 + C_HYundeliverable_yr7

gen C_HYstaff_yr8 = C_HYcontinuation_yr8 + C_HYundeliverable_yr8

gen C_HYstaff_yr9 = C_HYcontinuation_yr9 + C_HYundeliverable_yr9

gen C_HYstaff_yr10 = C_HYcontinuation_yr10 + C_HYundeliverable_yr10


*Cost of New Type I Errors*

gen C_HYt1newerrors_yr1 = (((N_HYAcards_yr1/P_ncoamovers_yr1) -
N_HYAcards_yr1) * C_t1pererror)

gen C_HYt1newerrors_yr2 = (((N_HYAcards_yr2/P_ncoamovers_yr2) -
N_HYAcards_yr2) * C_t1pererror)

gen C_HYt1newerrors_yr3 = (((N_HYAcards_yr3/P_ncoamovers_yr3) -
N_HYAcards_yr3) * C_t1pererror)

gen C_HYt1newerrors_yr4 = (((N_HYAcards_yr4/P_ncoamovers_yr4) -
N_HYAcards_yr4) * C_t1pererror)

gen C_HYt1newerrors_yr5 = (((N_HYAcards_yr5/P_ncoamovers_yr5) -
N_HYAcards_yr5) * C_t1pererror)

gen C_HYt1newerrors_yr6 = (((N_HYAcards_yr6/P_ncoamovers_yr6) -
N_HYAcards_yr6) * C_t1pererror)

gen C_HYt1newerrors_yr7 = (((N_HYAcards_yr7/P_ncoamovers_yr7) -
N_HYAcards_yr7) * C_t1pererror)

gen C_HYt1newerrors_yr8 = (((N_HYAcards_yr8/P_ncoamovers_yr8) -
N_HYAcards_yr8) * C_t1pererror)

gen C_HYt1newerrors_yr9 = (((N_HYAcards_yr9/P_ncoamovers_yr9) -
N_HYAcards_yr9) * C_t1pererror)

gen C_HYt1newerrors_yr10 = (((N_HYAcards_yr10/P_ncoamovers_yr10) -
N_HYAcards_yr10) * C_t1pererror)


*Total Costs of Type I Errors*

gen C_HYt1errors_yr1 = C_HYt1newerrors_yr1

gen C_HYt1errors_yr2 = C_HYt1newerrors_yr1 + C_HYt1newerrors_yr2
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gen C_HYt1errors_yr3 = C_HYt1newerrors_yr1 + C_HYt1newerrors_yr2 +
C_HYt1newerrors_yr3

gen C_HYt1errors_yr4 = C_HYt1newerrors_yr1 + C_HYt1newerrors_yr2 +
C_HYt1newerrors_yr3 + C_HYt1newerrors_yr4

gen C_HYt1errors_yr5 = C_HYt1newerrors_yr3 + C_HYt1newerrors_yr4 +
C_HYt1newerrors_yr5

gen C_HYt1errors_yr6 = C_HYt1newerrors_yr3 + C_HYt1newerrors_yr4 +
C_HYt1newerrors_yr5 + C_HYt1newerrors_yr6

gen C_HYt1errors_yr7 = C_HYt1newerrors_yr5 + C_HYt1newerrors_yr6 +
C_HYt1newerrors_yr7

gen C_HYt1errors_yr8 = C_HYt1newerrors_yr5 + C_HYt1newerrors_yr6 +
C_HYt1newerrors_yr7 + C_HYt1newerrors_yr8

gen C_HYt1errors_yr9 = C_HYt1newerrors_yr7 + C_HYt1newerrors_yr8 +
C_HYt1newerrors_yr9

gen C_HYt1errors_yr10 = C_HYt1newerrors_yr7 + C_HYt1newerrors_yr8 +
C_HYt1newerrors_yr9 + C_HYt1newerrors_yr10


*Percentage of Type II Errors from NCOA Mailing*

gen P_HYAt2errors_yr1 = P_HYAcontinuation_yr1 * runiform()

gen P_HYAt2errors_yr2 = P_HYAcontinuation_yr2 * runiform()

gen P_HYAt2errors_yr3 = P_HYAcontinuation_yr3 * runiform()

gen P_HYAt2errors_yr4 = P_HYAcontinuation_yr4 * runiform()

gen P_HYAt2errors_yr5 = P_HYAcontinuation_yr5 * runiform()

gen P_HYAt2errors_yr6 = P_HYAcontinuation_yr6 * runiform()

gen P_HYAt2errors_yr7 = P_HYAcontinuation_yr7 * runiform()

gen P_HYAt2errors_yr8 = P_HYAcontinuation_yr8 * runiform()

gen P_HYAt2errors_yr9 = P_HYAcontinuation_yr9 * runiform()

gen P_HYAt2errors_yr10 = P_HYAcontinuation_yr10 * runiform()


*Percentage of Type II Errors from Mass Mailing*

gen P_HYBt2errors_yr1 = P_HYBcontinuation_yr1 * runiform()

gen P_HYBt2errors_yr2 = P_HYBcontinuation_yr2 * runiform()

gen P_HYBt2errors_yr3 = P_HYBcontinuation_yr3 * runiform()

gen P_HYBt2errors_yr4 = P_HYBcontinuation_yr4 * runiform()

gen P_HYBt2errors_yr5 = P_HYBcontinuation_yr5 * runiform()

gen P_HYBt2errors_yr6 = P_HYBcontinuation_yr6 * runiform()

gen P_HYBt2errors_yr7 = P_HYBcontinuation_yr7 * runiform()

gen P_HYBt2errors_yr8 = P_HYBcontinuation_yr8 * runiform()
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gen P_HYBt2errors_yr9 = P_HYBcontinuation_yr9 * runiform()

gen P_HYBt2errors_yr10 = P_HYBcontinuation_yr10 * runiform()


*Cost of Type II Errors*

gen C_HYt2errors_yr1 = (((N_HYAcards_yr1 * P_HYAt2errors_yr1) +
(N_HYBcards_yr1 * P_HYBt2errors_yr1)) * C_t2pererror)

gen C_HYt2errors_yr2 = (((N_HYAcards_yr2 * P_HYAt2errors_yr2) +
(N_HYBcards_yr2 * P_HYBt2errors_yr2)) * C_t2pererror)

gen C_HYt2errors_yr3 = (((N_HYAcards_yr3 * P_HYAt2errors_yr3) +
(N_HYBcards_yr3 * P_HYBt2errors_yr3)) * C_t2pererror)

gen C_HYt2errors_yr4 = (((N_HYAcards_yr4 * P_HYAt2errors_yr4) +
(N_HYBcards_yr4 * P_HYBt2errors_yr4)) * C_t2pererror)

gen C_HYt2errors_yr5 = (((N_HYAcards_yr5 * P_HYAt2errors_yr5) +
(N_HYBcards_yr5 * P_HYBt2errors_yr5)) * C_t2pererror)

gen C_HYt2errors_yr6 = (((N_HYAcards_yr6 * P_HYAt2errors_yr6) +
(N_HYBcards_yr6 * P_HYBt2errors_yr6)) * C_t2pererror)

gen C_HYt2errors_yr7 = (((N_HYAcards_yr7 * P_HYAt2errors_yr7) +
(N_HYBcards_yr7 * P_HYBt2errors_yr7)) * C_t2pererror)

gen C_HYt2errors_yr8 = (((N_HYAcards_yr8 * P_HYAt2errors_yr8) +
(N_HYBcards_yr8 * P_HYBt2errors_yr8)) * C_t2pererror)

gen C_HYt2errors_yr9 = (((N_HYAcards_yr9 * P_HYAt2errors_yr9) +
(N_HYBcards_yr9 * P_HYBt2errors_yr9)) * C_t2pererror)

gen C_HYt2errors_yr10 = (((N_HYAcards_yr10 * P_HYAt2errors_yr10) +
(N_HYBcards_yr10 * P_HYBt2errors_yr10)) * C_t2pererror)


*Calculate Discounted Net Present Value*

gen C_HYyear1 = (C_ncoa + C_HYprinting_yr1 + C_HYmailing_yr1 +
C_HYstaff_yr1 + C_HYt1errors_yr1 + C_HYt2errors_yr1)/((1 +
discountrate)^0.5)

gen C_HYyear2 = (C_ncoa + C_HYprinting_yr2 + C_HYmailing_yr2 +
C_HYstaff_yr2 + C_HYt1errors_yr2 + C_HYt2errors_yr2)/((1 +
discountrate)^1.5)

gen C_HYyear3 = (C_ncoa + C_HYprinting_yr3 + C_HYmailing_yr3 +
C_HYstaff_yr3 + C_HYt1errors_yr3 + C_HYt2errors_yr3)/((1 +
discountrate)^2.5)

gen C_HYyear4 = (C_ncoa + C_HYprinting_yr4 + C_HYmailing_yr4 +
C_HYstaff_yr4 + C_HYt1errors_yr4 + C_HYt2errors_yr4)/((1 +
discountrate)^3.5)

gen C_HYyear5 = (C_ncoa + C_HYprinting_yr5 + C_HYmailing_yr5 +
C_HYstaff_yr5 + C_HYt1errors_yr5 + C_HYt2errors_yr5)/((1 +
discountrate)^4.5)
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gen C_HYyear6 = (C_ncoa + C_HYprinting_yr6 + C_HYmailing_yr6 +
C_HYstaff_yr6 + C_HYt1errors_yr6 + C_HYt2errors_yr6)/((1 +
discountrate)^5.5)

gen C_HYyear7 = (C_ncoa + C_HYprinting_yr7 + C_HYmailing_yr7 +
C_HYstaff_yr7 + C_HYt1errors_yr7 + C_HYt2errors_yr7)/((1 +
discountrate)^6.5)

gen C_HYyear8 = (C_ncoa + C_HYprinting_yr8 + C_HYmailing_yr8 +
C_HYstaff_yr8 + C_HYt1errors_yr8 + C_HYt2errors_yr8)/((1 +
discountrate)^7.5)

gen C_HYyear9 = (C_ncoa + C_HYprinting_yr9 + C_HYmailing_yr9 +
C_HYstaff_yr9 + C_HYt1errors_yr9 + C_HYt2errors_yr9)/((1 +
discountrate)^8.5)

gen C_HYyear10 = (C_ncoa + C_HYprinting_yr10 + C_HYmailing_yr10 +
C_HYstaff_yr10 + C_HYt1errors_yr10 + C_HYt2errors_yr10)/((1 +
discountrate)^9.5)


*Calculate Total Net Present Value*

gen C_HYtotal = C_startup + C_HYyear1 + C_HYyear2 + C_HYyear3 + C_HYyear4 +
C_HYyear5 + C_HYyear6 + C_HYyear7 + C_HYyear8 + C_HYyear9 + C_HYyear10

gen C_HYadjusted = C_SQtotal - C_HYtotal


//////////////////////

// Display Results //

//////////////////////


sum C_SQtotal C_NCtotal C_HYtotal

sum C_SQtotal C_NCadjusted C_HYadjusted
```